TECHNOLOGY OF AIRPORT SAFETY

HEARING

BEFORE THE

SUBCOMMITTEE ON TRANSPORTATION,
AVIATION AND MATERIALS

OF THE

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SCIENCE AND TECHNOLOGY
U.S. HOUSE OF REPRESENTATIVES

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TECHNOLOGY OF AIRPORT SAFETY

MONDAY, JULY 18, 1983

House of Representatives,
Committee on Science and Technology,
Subcommittee on Transportation,
Aviation and Materials,
Washington, D.C.

The subcommittee met, pursuant to call, at 9:30 a.m., in room 2318, Rayburn House Office Building, Hon. Dan R. Glickman (chairman of the subcommittee) presiding.

Mr. **Glickman**. Why don't we go ahead and begin the hearing this morning. I am sure we are going to have other members coming, but in consideration of the witnesses who need to move on and do other things, I think we will start.

Today the subcommittee will examine the problems of airport safety with an emphasis on the use of new technology to enhance the safety of our airport systems.

It is clear that airports represent the most critical juncture in air transportation. Over half of all civil aviation accidents occur at or near airports. Therefore, it is appropriate that the subcommittee examine airport safety technology generally, as well as specific criticisms of specific airports, in order to determine the adequacy of current Government policy and research efforts.

In previous hearings, this subcommittee has considered subjects such as the hazards associated with low-level wind shear which led to the tragic Pan Am accident near New Orleans last year; and aircraft operations in bad weather, such as the conditions which contributed to the accidents at National Airport here in Washington and Boston Logan last year. This subcommittee has supported expedited research activities on wind shear, aircraft deicing, and runway performance as well as on other activities. We intend to continue these efforts.

The topic of airport safety technology encompasses a wide range of complex subjects, and we will attempt to address the most important ones in order to determine what research should be given high priority.

In addition, the subcommittee is interested in looking at some specific airport problems. For example, I am particularly concerned about the northern approach procedures to runway 18 at Washington National Airport. As a result of an incident on December 28, 1982, where a Piedmont 737 came dangerously close to the USA Today building in Rosslyn, Va., the National Transportation Safety Board recommended that the Federal Aviation Administration make a number of changes in the nonprecision approach to runway

18, and questioned the adequacy of the minimum safe altitude warning [MSAW] system at National Airport.

This is a potentially serious matter, and the subcommittee has a responsibility to hear why the Federal Aviation Administration rejected the National Transportation Safety Board's recommendations and if this is a major concern to airline pilots.

We would also like to go into some detail, as time permits, on a number of other important matters such as the approach and departure procedures at other airports, the impact of noise abatement procedures on safety, current aviation weather programs, terminal area guidance, airport design criteria, and fire and rescue capabilities.

In addition, we will review the technological needs and opportunities presented by short takeoff and landing aircraft and whether or not we should move to use this technology to increase airport capacity.

I might mention that the emphasis in most aviation circles has tended to focus on the airplane, itself, or the air traffic control system moving the airplane between certain parts of this country. In my judgment, the efforts on accelerating research and development and modernizing the airport itself, however, has kind of taken a back seat to these other areas. And inasmuch as the airport itself is the focal point for air traffic, I think that at least with respect to safety research we need to give that higher priority.

I want to thank the expert witnesses that agreed to assist us in this effort today. I look forward to a very productive and enlightening hearing. All statements of other members will be included in the record if they wish to put them in.

Specifically, Mr. Carney's statement will be put in the record immediately following mine.

[The prepared statement of Mr. Carney follows:]

OPENING STATEMENT
HONORABLE BILL CARNEY
AIRPORT SAFETY TECHNOLOGY
JULY 18, 1983

THANK YOU MR. CHAIRMAN.

THE JOB OF PROVIDING THE DESIRED AIR TRANSPORTATION SERVICES FOR THE NATION'S TRAVELERS IS BECOMING INCREASINGLY COMPLEX, AND IS PRESENTING A REAL CHALLENGE FOR THE FUTURE. THERE ARE MANY CONFLICTING FACTORS; AND IF WE WANT TO CONTINUE TO ENJOY THE SAFE AND CONVENIENT AIR TRAVEL THAT WE HAVE TODAY, IT IS IMPERATIVE THAT WE UTILIZE THE MOST ADVANCED TECHNOLOGY AVAILABLE TO ADDRESS SOME OF THESE ISSUES.

THE TERMINAL AREA HAS BECOME THE LIMITING FACTOR IN MEETING THE INCREASED DEMAND FOR AIR TRAVEL. AS YOU STATED, MR. CHAIRMAN, OVER HALF OF ALL CIVIL AVIATION ACCIDENTS OCCUR AT OR NEAR AIRPORTS. THE DEMAND ON THE NATION'S AIRPORT SYSTEM IS FORECAST TO MORE THAN DOUBLE BY THE TURN OF THE CENTURY. AND, TO COMPOUND THE PROBLEM, MOST OF THIS TRAFFIC IS CONCENTRATED AT A FEW MAJOR AIRPORTS. TODAY, 27 KEY AIRPORTS HANDLE ROUGHLY 70 PER CENT OF ALL PASSENGERS, AND QUESTIONS HAVE NATURALLY ARISEN CONCERNING THE SAFETY SURROUNDING THESE CONGESTED AIRPORTS. AIRPORTS AND THE SURROUNDING ENVIRONMENT CONTINUE TO BE A SOURCE OF CONTROVERSY -- FOR FLYERS AND NON-FLYERS ALIKE. NO ONE WANTS THE NOISE OR THE PERCEIVED HAZARDS OF AN AIRPORT IN THEIR NEIGHBORHOOD; YET THE FLYING PUBLIC WANTS THE CONVENIENCE OF A MAJOR AIRPORT NEARBY.

HOW TO INCREASE THE CAPACITY OF OUR EXISTING AIRPORTS AND MAKE THEM LESS OBJECTIONABLE TO THE PUBLIC WITHOUT COMPROMISING SAFETY IS

THE MAJOR CHALLENGE FOR THE FUTURE. FORTUNATELY, THERE ARE MANY AREAS WHERE TECHNOLOGY WILL HELP US MEET THIS CHALLENGE. THERE ARE MANY PROMISING AREAS OF RESEARCH WHICH CAN LEAD TO SUBSTANTIAL IMPROVEMENTS IN OUR EXISTING FACILITIES AND IN THE WAYS THAT WE USE THEM.

THERE IS A WIDE RANGE OF ON-GOING RESEARCH PROGRAMS DIRECTED TOWARD MORE EFFICIENT UTILIZATION OF TERMINAL AIRSPACE AND REDUCING RUNWAY OCCUPANCY TIME. IN ADDITION SUBSTANTIAL EFFORT IS BEING DEVOTED TO ENHANCING BOTH THE SAFETY AND THE ENVIRONMENT AROUND THE AIRPORTS.

IT IS APPROPRIATE THAT WE REVIEW THESE PROGRAMS TO SATISFY OURSELVES THAT THEY ARE INDEED ACCOMPLISHING THE DESIRED OBJECTIVES, AND DOING SO IN A COST EFFECTIVE MANNER. THE WITNESSES WE WILL BE HEARING FROM TODAY ARE WELL QUALIFIED TO COMMENT ON THESE PROGRAMS AS WELL AS IDENTIFY OTHER AREAS NEEDING ATTENTION. I AM SURE WE WILL FIND THEIR COMMENTS HELPFUL AND INFORMATIVE.

I BELIEVE WE CAN SUCCESSFULLY MEET THE CHALLENGES FACING US. I ESPECIALLY APPLAUD THE SPIRIT OF COOPERATION BETWEEN NASA AND THE FAA IN ADDRESSING THESE IMPORTANT ISSUES. AND WITH THE CONTINUED DEDICATED EFFORTS OF THESE TWO AGENCIES, I'M CONFIDENT WE CAN BUILD THE AIR TRANSPORTATION SYSTEM THAT WILL MEET THE DEMANDS OF THE FUTURE. I AM ALSO ENCOURAGED THAT WITH THE CONTINUED COMMITMENT TO SAFETY, WE WILL MAKE AIR TRAVEL EVEN SAFER THAN IT IS TODAY.

THAT CONCLUDES MY STATEMENT MR. CHAIRMAN. I JOIN YOU IN WELCOMING OUR DISTINGUISHED WITNESSES.

Mr. GLICKMAN. Our first witness is no stranger to the committee, the Honorable Jim Burnett of the NTSB. It is a pleasure to have you here, Jim. You may proceed as usual in your expert way. I don't know whether you have a prepared statement. We do have one.

Mr. BURNETT. Yes; I will present a shortened version of it this morning.

Mr. GLICKMAN. OK.

STATEMENT OF HON. JIM BURNETT, CHAIRMAN, NATIONAL TRANSPORTATION SAFETY BOARD, ACCOMPANIED BY WILLIAM G. LAYNOR, DEPUTY DIRECTOR, BUREAU OF TECHNOLOGY; AND DR. BERNARD LOEB, CHIEF, SAFETY ANALYSIS DIVISION, BUREAU OF SAFETY PROGRAMS AND MANAGER OF BOARD'S AIRPORT STUDY

Mr. BURNETT. Good morning, Mr. Chairman and members of the committee. I am pleased to be here with you today to address the subject of airport safety technology. As you know, the Safety Board currently has underway a study to review the adequacy of airport certification criteria and operations.

In view of the fact that this study is ongoing, I am limited to a general discussion of the issues involved pending the Board's review and approval of the overall study. Thus, it would be inappropriate for me to discuss any conclusions or recommendations that may come from our study, with the exception of those that have already been issued.

Before I begin, I would like to introduce Mr. William Laynor, Deputy Director of the Bureau of Technology, who has been responsible for the technical development and most of our recommendations pertaining to airport safety, and Dr. Bernard Loeb, who is Chief of the Safety Analysis Division, and also the project officer responsible for the study we have ongoing.

Technology considerations are only one facet of the Safety Board's study. Therefore, I would like to place airport safety technology in perspective by describing our study efforts to date and highlighting some areas which might benefit from applications of existing technology or technological advancements.

For several decades specific concerns regarding the safety of airport operations have been identified through airport user experience and accident investigation. These concerns were clearly articulated in congressional testimony in 1969 leading to the enactment of the Airway Development Act of 1970, which extended the FAA's certification and surveillance authority to air carrier airports.

Responding to this legislative mandate, the FAA developed and promulgated part 139 of the Federal aviation regulation which established standards for airports serving certificated air carriers.

These standards, adopted in 1972, addressed a wide range of airport physical features, facilities, services, and operating procedures, all of which were considered crucial to safe aircraft operation. In fact, many of the areas covered by part 139 regulations have been concerns of the Safety Board for some time, as evidenced by our 1970 recommendation for traction testing requirements, our 1972 recommendations for compatibility of land use around airports and installation of runway distance markers.

Other airport recommendations issued since 1976 include: Bird hazard mitigation; currency of airport operations manuals; crash-fire rescue capabilities; emergency and disaster planning; fuel storage and dispensing procedures; delethalization of safety areas around airports and runway surface conditions testing and maintenance.

The 1982 Air Florida crash near National Airport and the World Airways accident at Boston Logan Airport tragically reemphasized several airport safety issues, including potential safety problems associated with physically limited airports designed and constructed to standards existing before the advent of commercial turbojets.

The Safety Board adopted a study method involving a survey of a carefully selected group of airports which would permit comparisons of those certificated by different FAA regional jurisdictions, as well as comparisons of older and newer airport facilities located in the same geographical area. After evaluating several airports on the basis of factors such as passenger enplanements, runway length, safety area characteristics, types of aircraft served, construction and modification dates, accident and incident histories, and approach area characteristics, a study group consisting of 14 airports located in 7 different FAA regions was selected for detailed evaluation.

Although data reduction and analysis, as well as preparation of the report are still in progress, the study team has collected the following preliminary findings which I would like to share with you:

Substantial variations were found among FAA regional determinations regarding what constitutes compliance with part 139 and how compliance should be obtained.

FAA airport certification inspector workload varied considerably from region to region.

Off-airport land use by local jurisdiction, such as waste disposal site locations, can result in obstructions or other potential hazards, which are beyond the control of the FAA and airport management.

Several differences were documented in crash-fire-rescue training and staffing as well as in emergency and disaster plans which were approved by FAA regions under part 139 requirements.

Observation of animals within the perimeter areas of some airports indicated that possible problems exist with present control measures.

Overall airport management philosophy and level of commitment to airport facility maintenance varied greatly at the airports under study.

Dimensional and physical characteristics of airport safety areas and their influence on runway maintenance philosophy differed among the airports under study.

A lack of standardization in the construction of fuel storage facilities was observed.

Two additional areas of concern to the Board with regard to airport operations include aircraft operations on wet or slippery runways and the hazards associated with low-level windshear encounters. Our concern for the former was documented in safety recommendations resulting from the World Airways DC-10 accident in

Boston, and concern for the latter was articulated in recommendations issued after the July 1982 Pan American B-727 crash in Kenner, La.

One final matter I would like to mention concerns the exception I made at the beginning of my testimony regarding the limits to which I can discuss potential conclusions and recommendations resulting from the Safety Board's airport study.

On December 28, 1982, shortly after our study team was assembled, an incident took place right in our own backyard in which a B-737 was reported by numerous ground witnesses to have flown dangerously close to a relatively tall building located in Rosslyn, Va. Although the FAA insisted that the plane made a normal instrument approach, the Board decided to investigate the incident as a part of its review of Washington National Airport operations in connection with the airport study.

The Board determined that the plane was, indeed, low—at an altitude of about 400 foot when passing the 396-foot-high USA Today Building. In addition, the airplane drifted to the right of the inbound course—I think the course would have placed it 500 feet away—placing it nearer the building than it normally should have passed.

In a letter to the FAA Administrator, dated March 24, 1983, the Safety Board made four recommendations designed to prevent occurrences of planes flying too low and too close to densely populated areas on approach to Washington National Airport.

The FAA did not concur. Mr. Chairman, with your permission, I would like to submit the March 24 letter for the record, along with the FAA's July 5 response. These letters provide the subcommittee with a more detailed explanation of both sides of the issue.

The Safety Board strongly disagrees with the FAA's position and currently is in the process of preparing a response. I assure you that this matter is not closed.

This concludes my statement, and I would be pleased to answer any questions you may have.

[The prepared statement of Hon. Jim Burnett follows:]

TESTIMONY OF
HONORABLE JIM BURNETT
CHAIRMAN, NATIONAL TRANSPORTATION SAFETY BOARD

Good morning. I am pleased to be here with you today to address the subject of airport safety technology. As you know, the Safety Board currently has underway a study to review the adequacy of airport certification criteria and operations. In view of the fact that this study is ongoing, I am limited to a general discussion of the issues involved pending the Board's review and approval of the overall study. Thus it would be inappropriate for me to discuss any conclusions or recommendations that may come from our study, with the exception of those that have already been issued. I will refer to this exception later in my testimony.

Technology considerations are only one facet of the Safety Board's study. Therefore, I would like to place airport safety technology in perspective by describing our study effort to date and highlighting some areas which might benefit from applications of existing technology or technological advancements.

For several decades specific concerns regarding the safety of airport operations have been identified through airport user experience and accident investigation. These concerns were clearly articulated in Congressional testimony in 1969 leading to the enactment of the Airway Development Act of 1970, which extended the FAA's certification and surveillance authority to air carrier airports. Responding to this legislative mandate, the FAA developed and promulgated Part 139 of the Federal Aviation Regulation which established standards for airports serving certificated air carriers.

These standards, adopted in 1972, addressed a wide range of airport physical features, facilities, services and operating procedures, all of which were considered crucial to safe aircraft operation. In fact, many of the areas covered by Part 139 regulations have been concerns of the Safety Board for some time, as evidenced by our 1970 recommendation for traction testing requirements, our 1972 recommendations for compatibility of land use around airports and installation of runway distance markers, and several other airport recommendations issued since 1976 regarding:

- Bird hazard mitigation
- Currency of airport operations manuals
- Crash-fire-rescue capabilities
- Emergency and disaster planning
- Fuel storage and dispensing procedures
- Delethalization of "safety areas" around airports
- Runway surface conditions testing and maintenance

The 1982 Air Florida crash near National Airport and the World Airways accident at Boston Logan Airport tragically re-emphasized several airport safety issues, including potential safety problems associated with physically-limited airports designed and constructed to standards existing before the advent of commercial turbojets.

The Safety Board adopted a study method involving a survey of a carefully selected group of airports which would permit comparisons of those certificated by different FAA regional jurisdictions, as well as comparisons of older and newer airport facilities located in the same geographical area. After evaluating several airports on the basis of factors such as passenger enplanements runway length, safety area characteristics, types of aircraft served, construction and modification dates, accident and incident histories, and approach area characteristics, a study group consisting of 14 airports located in 7 different FAA regions was selected for detailed evaluation.

Those airports are: Washington National, Dulles International, Kennedy International, LaGuardia, Los Angeles International, Burbank-Glendale-Pasadena, Houston Intercontinental, Houston Hobby Airport, Chicago O'Hare, Chicago-Midway, San Diego-Lindbergh Denver's Stapleton International, Boston's Logan International, and Ft. Lauderdale-Hollywood, Florida.

The study plan called for collection of information in the general categories of:

- Airfield operations and maintenance
- Crash-fire-rescue capabilities
- Aircraft operational concerns
- Airport and regional management considerations

Although data reduction and analysis, as well as preparation of the report are still in progress, the study team has collected the following preliminary findings which I would like to share with you:

- Substantial variations were found among FAA regional determinations regarding what constitutes compliance with Part 139 and how compliance should be obtained;
- FAA airport certification inspector workload varied considerably (certificated airports per inspector on an annual basis) from region to region;

- Off-airport land use by local jurisdiction, such as waste disposal site locations, can result in obstructions or other potential hazards, which are beyond the control of the FAA and airport management;

- Several differences were documented in crash-fire-rescue training and staffing as well as in emergency and disaster plans which were approved by FAA regions under Part 139 requirements;

- Observation of animals within the perimeter areas of some airports indicated that possible problems exist with present control measures;

- Overall airport management philosophy and level of commitment to airport facility maintenance varied greatly at the airports under study;

- Dimensional and physical characteristics of airport safety areas and their influence on runway maintenance philosophy differed among the airports under study;

- A lack of standardization in the construction of fuel storage facilities.

Two additional areas of concern to the Board with regard to airport operations include aircraft operations on wet or slippery runways and the hazards associated with low level windshear encounters. Our concern for the former was documented in safety recommendations resulting from the World Airways DC-10 accident in Boston, and for the latter was articulated in recommendations issued after the July 1982 Pan American B-727 crash in Kenner, Louisiana.

In view of the importance to safe operations of an ability to assess accurately runway conditions and their impact on aircraft performance, we have had staff participate in the NASA/FAA Runway Friction Program. The correlation study of friction measuring devices described in a draft FAA report dated March 1983, as well as recent NASA tests involving use of a Boeing 737 airplane designed to develop a relationship between aircraft and ground vehicle friction measurements, are encouraging signs that continued development and application of technology in the NASA/FAA Runway Friction Program may eventually lead to a reliable, timely method of providing pilots with accurate runway condition information. We are looking forward to seeing the results of the second phase of aircraft testing on operational runways which is scheduled to begin late this year.

During its investigation of the Pan American B-727 crash at Kenner, the Board identified a number of potential safety benefits which can result from the Joint Airport Weather Studies (JAWS) project. This project, established in 1980 and jointly administered by the National Center for Atmospheric Research and the University of Chicago, was established to examine convectively-driven downdrafts and resulting outflow near the earth's surface. If the objectives of this project are realized, characteristics of hazardous convective windshear events will be defined, the potential hazard to aircraft will be determined and techniques to detect and warn of low level windshear could be considerably improved. We consider the continuation of the JAWS program to be an essential element in the search for a reliable system which can provide pilots with timely information about the presence and operational significance of low level windshear.

One final matter I would like to mention concerns the exception I made at the beginning of my testimony regarding the limits to which I can discuss potential conclusions and recommendations resulting from the Safety Board's airport study.

On December 28, 1982, shortly after our study team was assembled, an incident took place "right in our own back yard" in which a B-737 was reported by numerous ground witnesses to have flown dangerously close to a relatively tall building located in Rosslyn, Virginia. Although the FAA insisted that the plane made a "normal instrument approach", the Board decided to investigate the incident as a part of its review of Washington National Airport operations in connection with the airport study.

The Board determined that the plane was, indeed, low -- at an altitude about 400 feet when passing the 396-feet high USA Today Building. In addition, the airplane drifted to the right of the inbound course, placing it nearer the building than it normally should have passed.

In a letter to the FAA Administrator dated March 24, 1983, the Safety Board made four recommendations designed to prevent occurrences of planes flying too low and too close to densely populated areas on approach to Washington National Airport.

One recommendation was that a VDP (Visual Descent Point) be added to the VOR/DME (Very High Frequency Omnidirection Range Station/Distance Measuring Equipment) Runway 18 approach. The Board believes that a practical way of reducing, if not eliminating, premature descents would be to add a visual descent point to the prescribed nonprecision approach procedures since it would eliminate subjectivity regarding when to commence the descent from the MDA (Minimum Descent Altitude) to the runway.

The FAA did not concur.

Another recommendation was that the LDA (Localizer Type Directional Aid) Runway 18 approach course be realigned closer to the Potomac River and that glideslope guidance be provided down to the lowest altitude allowable by TERPS (Terminal Instrument Procedures) criteria. The Board believes that an LDA approach course further east over the Potomac River would take airplanes away from the center of Rosslyn and, if the glideslope were utilized, it would not only keep the planes higher while passing over the other noise-sensitive areas, but it would also provide precision descent guidance to pilots.

The FAA did not concur.

During its evaluation of the LDA Runway 18 approach, the Board noted that the approach chart depicts visual flight over the river beginning at 3.5 miles. However, no mention is made transitioning to visual flight on the VOR/DME runway approach chart.

Therefore, a recommendation was made to amend the VOR/DME Runway 18 approach chart to depict a transition to visual flight over the Potomac River similar to that depicted on the current LDA Runway 18 approach chart and include an advisory regarding transition to visual flight.

The Safety Board believes that flying the visual river approach whenever possible will take planes further away from obstacles in the flight path.

Once again, the FAA did not concur in the recommendation.

The fourth and last recommendation was based on our finding during the investigation that no one in the tower or in approach control was aware of how low and how close the plane in question was to the USA Today Building. Also, we learned that the MSAW (Minimum Safe Altitude Warning) system is at times unreliable. The Board recommended that the ARTS-3 (Automated Radar Terminal Service) antenna array be moved to a site where it would provide more reliable operation of the minimum safe altitude warning system.

The FAA did not concur, saying it found "...no reason to doubt that the facility was operating in a satisfactory manner and located at its optimum geographical position for Washington National Airport."

Mr. Chairman, I won't take the Subcommittee's time here to review this issue in any more detail, but with your permission, I would like to submit the Safety Board's March 24th letter to the FAA for the record, along with the FAA's July 5th response.

These letters will provide the Subcommittee with a more detailed explanation of both sides of the issue. The Safety Board strongly disagree with the FAA's position, and currently is in the process of preparing a response. I assure you this matter is not closed.

That concludes my statement, and I would be pleased to answer any questions you may have.

Mr. GLICKMAN. Thank you, Mr. Burnett.

In your testimony, you said that in your preliminary review of airport safety that you are doing, substantial variations were found among FAA regional determinations on part 139 and how compliance should be obtained. So what you are saying is in one region of the country with respect to one airport, there are different standards being applied to airport safety than in another region of the country.

Mr. BURNETT. That is true. Those are our preliminary findings. That may not all be bad but we are going to have to analyze that aspect further in the course of preparing our report.

Mr. GLICKMAN. Well, can you give me an example of the kinds of things that would be different between different regions, different parts of the country, different airports?

Mr. BURNETT. Dr. Loeb.

Dr. LOEB. Yes, specifically there will be times when enforcement philosophy will differ. In some cases, an approach will be used to work with the airport managers and moral suasion will be the method used to try to obtain compliance.

In other cases, the methods of enforcement might be to come down somewhat harder. In some cases, certain specific recommendations to the airports are made regarding specific parts of 139 that might not be treated by other regions.

So there are differences. I wouldn't say that the standards differ. I would say that just the emphasis differs.

Mr. GLICKMAN. Give me an example of something specific.

Dr. LOEB. Perhaps runway maintenance. When a given runway should be regrooved, when tar should be removed from the runways. There are just differences in philosophies and that probably pertains to crash, fire and rescue, and to any number of other areas.

Right now we are still in the process of analyzing the data we have collected. I think to go beyond this at this point would be premature.

Mr. GLICKMAN. Let me go back to the basic question then. The issue of whether a runway should be grooved or not grooved, is that an airport decision or an FAA decision?

Dr. LOEB. Well, let me back up. First of all, I was talking about when you have a grooved runway; as the airplanes land, you pick up deposits of rubber and so now after a period of time you don't have grooves any more. You have grooves filled with rubber, and the question is, when you clean those and how quickly and so forth.

Mr. GLICKMAN. And you are saying that the enforcement philosophy will differ so in some cases the same penalty and airport may get some sort of a violation and in other cases there will be no violation by the FAA?

Dr. LOEB. That could be the case. Yes.

Another area is in fueling that you see differences. Snow removal is another area where you see different philosophies of what constitutes compliance and what does not.

Mr. GLICKMAN. Just to take an example. The part will say something like the runway shall be clear of ice and snow and will leave it up to the airport to decide how to do it?

Dr. LOEB. That is correct. That should be in their manuals; they have a snow committee and so forth that determines when and how. However, in some cases, compliance might be when you have 2 inches of snow and in another case it might be half an inch of snow; it might be neither of those. It may be when conditions are reported as poor or nil. So there are just differing philosophies.

Mr. GLICKMAN. Do you think that FAA part 139 should be revised substantially and made more specific?

Mr. BURNETT. We are not ready to make that kind of conclusion yet, Mr. Chairman.

Mr. GLICKMAN. But clearly there is great variation between airports on how they implement part 139?

Mr. BURNETT. There is some variation and I think we are going to have to look at that very carefully. We need to be careful that we do not place undue emphasis on consistency and thus encourage strictly aggressive enforcement. Regional officials might be discouraged from being in the forefront in trying to solve problems they perceive to be particularly acute in their region.

We want to look at it more carefully in the course of our analysis to see to what extent it contributes to good enforcement practices and to what extent it may be reflective of sloppy enforcement practices.

Mr. GLICKMAN. Well, you see if I am landing at an airport, I would like to know that the standards at that airport are as good as any standards in the country, and I hate to maybe choose my flights according to which airport I am going to land at because X airport has better enforcement standards than Y airport, and I assume you are trying to insure that the FAA is enforcing those things.

Do you have at this stage evidence that any specific airports in this country have received more enforcement violations than other airports? Are there any airports that have particularly been cited for FAA part 139 failure to inspect and relate to things?

Dr. LOEB. There are differences. As I said before, in terms of enforcement, I am reluctant to answer that question at this point other than I will say that it appears from the work we have done so far that the Southwest region tends to be more violation oriented than some other regions, but I don't know that we are prepared at this point to——

Mr. **GLICKMAN**. You mean the Southwest region? Where is the Southwest regional office located?

Dr. **LOEB**. In Texas.

Mr. **GLICKMAN**. They are more likely to issue a violation than the other regions are?

Mr. **BURNETT**. It seems they may be, Mr. Chairman.

Dr. **LOEB**. From a sheer count that would appear to be the case, but that could be misleading.

Mr. **GLICKMAN**. We don't know whether they are just more enforcement oriented or there are more problems in that region?

Mr. **BURNETT**. That is the problem and for us to indicate that one airport received more violations than any others may suggest that there is a problem when it may be a difference in the FAA enforcement approach.

Mr. **GLICKMAN**. But on page 4 you say the FAA in certification inspector workload varied considerably from region to region. That means you have more man-hours in one region or another with respect to airport certification?

Dr. **LOEB**. What that means is that in some regions you will have 20 airports per inspector and in other regions you may have 40 and 60 airports per inspector with an enormous variation in workload. What this means we don't know right now, but we are looking into that because that was probably one of the most significant features, the enormous difference in the number of airports per inspector to handle.

Obviously they can visit only so many airports. Geography plays a part. If they have to go further, it takes longer and so forth, but there is an enormous variation regionwise.

Mr. **GLICKMAN**. Let me go for a moment to the situation that you mentioned on Piedmont 737. During your investigation of the Piedmont 737 which came close to the USA Today Building, were you able to determine the frequency of similar incidents where aircraft have come too low or too close to the buildings in Rosslyn?

Mr. **BURNETT**. No; we did not undertake to determine the frequency with which that takes place. That is really something that is out of our manpower capability. Mr. Laynor, do you have any further comment on that?

Mr. **LAYNOR**. Well, in order to determine the flight path taken by the aircraft on approach means obtaining and reducing the radar data that is recorded from that aircraft, and while we have the capability to do that in the investigation of an incident or an accident, to take on a major project would be far beyond the capability of our staff.

Mr. **BURNETT**. This required a pulling the flight data recorder in question and comparing it with radar readouts that we obtained from the FAA, and it was a very time-consuming effort just to check this one incident. For us to monitor it on a wider scale would be prohibitive.

Mr. **GLICKMAN**. Well, you know, I have always been concerned about the fact that there are skyscrapers near the flight patterns of this airport and obviously I would guess because of the regulatory situation the buildings came after the runways, and there wasn't much the FAA, I guess, could do to prevent the construction of those buildings, was there?

Mr. BURNETT. As far as I know, they don't have any power to do that.

Mr. GLICKMAN. And the height limitation on these buildings, were they in any way related to the operation of that airport?

Mr. LAYNOR. Well, I would like to add to one of your previous questions that in the investigation of the Piedmont incident, our investigators talked to a number of people who work in the USA Today Building, and their opinions were very subjective, of course, but they alluded that they are quite frequently a little concerned about the proximity of some of the airplanes on that approach.

Mr. GLICKMAN. It is damn close to the flight pattern, isn't it?

Mr. LAYNOR. The building itself does not intrude upon the legal obstruction path for the approaches that are conducted over Rosslyn. One of our concerns is that in very low ceiling weather there seems to be a tendency perhaps to come a little bit closer, sneaking down perhaps when you visually acquire the airport on the VOR-DME approach. The approach itself requires aircraft to be at an altitude of 900 feet above sea level at a 3 nautical mile DME fix.

The building is inside of the lateral span of the approach clearance and the legal height above that building has to be 250 feet of clearance for any aircraft. The building, I might add, is only about 2,000 feet within the 3 nautical mile DME fix, so this would normally put aircraft at about 800 feet descending from 900 feet to minimum descent altitude of 720 feet. Beyond that, if the aircraft picks up the runway visually, it can descend below the MDA.

However, the proximity of the three DME fix itself to that building is kind of a constraint on the minimum altitude that the airplane could be.

Mr. GLICKMAN. What you are saying is that the pilot wants to get down to see that runway and in doing so he may get down a little more quickly than he should?

Mr. LAYNOR. Well, on the day in question, the ceiling was varying between 600 or 700 feet. It was probably higher at times. Most likely, the pilot picked up the runway at a higher altitude, but in order to keep sight of it, he descended down below 700 feet in order to maintain sight of the runway environment.

Mr. GLICKMAN. Now, if, in fact, the minimum safe altitude warning at National Airport is unreliable, is there any way to determine how often airplanes come in too low on their flight to National other than reaching the flight data recorder on every airplane?

Mr. LAYNOR. Well, during the investigation of that incident, our investigators spoke to the controllers at National, and it was their observation that quite often the altitude encoding portion of the aircraft transponder return is somewhat spotty. It is occasionally not recorded or not transmitted or not received, at least by the airport radar and aircraft making that approach. It could be because the reflections of the signals off the nearby buildings or for other reasons the signal gets scrambled and it is just not received and decoded.

The investigators cited this as a concern because the altitude and code reply is what is necessary to key the minimum safe altitude warning, and they say that this is not reliable.

They also observed that occasionally when the equipment is picked up after maintenance it becomes a little bit more reliable, but it does not maintain that.

Mr. GLICKMAN. Let me ask you this. Are there other airports where similar incidents have occurred like San Diego Lindbergh, for example, Chicago Midway?

Mr. LAYNOR. Well, I can't answer specifics. We are reasonably sure that there are other airports where similar approaches result in a closer proximity than we would like to see.

Mr. GLICKMAN. Going back again to the specific recommendations you made, one of them was that at Washington National the Arts III system be relocated. Does the NTSB have technical reasons to reflect the optimum geographic location?

Mr. LAYNOR. We don't have technical capability to research what an optimum location could be at Washington National, no, sir.

Mr. GLICKMAN. Do you have a recommendation as to how to define the standardization of airport design and still leave the flexibility of design to local community, terrain, weather, and materials characteristics?

Mr. BURNETT. No; I don't believe we do, we are looking at the relationship between airport use and other land use questions around the airport area and to what extent that may be a problem, and then we will be considering what might be done.

Mr. GLICKMAN. Let me ask you this, about your airport study that you are doing now on these 14 airports, when do you expect that to be completed?

Mr. BURNETT. We are now estimating October.

Mr. GLICKMAN. And will you issue specific recommendations at that time?

Mr. BURNETT. Well, we are still in the process of making the analysis, but we will be issuing specific recommendations. I don't know to what extent they will be site specific insofar as they relate to individual airports. Our purpose for doing this study is not to study the airports involved. That is not the primary purpose.

It is to study the certification criteria in part 139, and to do that by studying individual airports. So I don't think we really know yet to what extent we will have site specific or airport specific recommendations to make, but, of course, we will be making recommendations.

Mr. GLICKMAN. Would it be possible that you might recommend closing down airports or restricting operations at airports?

Mr. BURNETT. Well, I don't think there is anything in what we have learned so far that would indicate to me that that would be something we would find necessary.

Mr. GLICKMAN. But you would be making recommendations on perhaps the disparity of compliance, certification compliance, as well as enforcement-related activities from airport to airport. You might be making recommendations on workload, certification workload, as well as the other items contained in your statements?

Mr. BURNETT. We might also be addressing waivers that have been granted to part 139.

Dr. LOEB. We are looking at all of those issues in each specific area that 139 addresses, and we obviously will have recommendations, but at this point I think it is premature to say what the specific recommendations would be. There is a possibility of some site-specific recommendations, but that would be a smaller part of the overall scope of the recommendation.

Mr. GLICKMAN. And will you be making, perhaps in this regard, recommendations with respect to some of the new technology that is coming onboard, landing systems, that might or should be utilized in certain airports and related kinds of things whether it is MLS or STOL?

Dr. LOEB. The answer is yes. That is quite likely, especially in regard to MLS, where that might be a more effective method for precision landing.

Mr. GLICKMAN. Well, I would thank you, Mr. Burnett. I am going to yield to Mr. Carney, but I would say just in conclusion, from my standpoint again I think that the emphasis on research and aviation has not been geared as much toward the airport side of the picture as it has been toward the airplane side of the picture, and it worries me and ought to worry my constituents if you are going from airport to airport in America operating under different safety and enforcement requirements because that not only leads to lack of uniformity but leads to lack of confidence in flying. And I think that is something we ought to try to avoid.

Mr. BURNETT. We share your concern, and that is the reason we are conducting this study.

Mr. GLICKMAN. Let me ask you, was this study a self-initiated study? Did you do this on your own, or were you prompted by some of the recent problems at, let's say, Logan and Washington National?

Mr. BURNETT. Well, I made the decision to ask the Board for authority to undergo the study. We did so because we had over the years received a lot of requests for studies of individual airports, including some for the study of Washington National in particular.

We always had a policy of not studying individual airports simply because it is outside of our manpower capabilities. But it was my thinking that we were failing to address a very significant safety issue that was not coming up frequently enough in connection with accidents to be able to address it in the course of the accident investigation process.

So I asked the Board for authority to undergo the study, and we did so.

Mr. GLICKMAN. Thank you.

Mr. Carney.

Mr. CARNEY. Thank you, Mr. Chairman.

Mr. Burnett, how big a problem is encroachment around the Nation? We are familiar with LaGuardia and National and the problems in San Diego and Chicago is probably another example, at Midway. How big a problem is the encroachment around the Nation? Do you see in the next 20 years numbers of airports faced with the problems that the ones I just mentioned are?

Dr. LOEB. There is a problem. I don't think our study indicates that this is a severe problem at the present time. There are some specific airports that seem to have a larger problem than other airports, but apparently, from what we have been able to gather so far in the investigation, moral suasion, talking, and so forth, has pretty much helped.

In those areas where problems could have existed and buildings could have gone up or where powerlines needed to be removed and so forth, the moral suasion aspect has worked and very few of these airports have actually gotten into litigation where these issues have gone to court. We don't see it right now as an overwhelming problem.

Mr. CARNEY. Is not this a greater problem for the major airports or the airports that might be higher on a pecking order for problems than those related to the safety of the facility itself?

Dr. LOEB. No; I don't think that right now the biggest safety problem is in regard to obstacles, obstructions. There are concerns obviously that as communities filled out around airports, you have schools and hospitals and so forth and if an airplane does have an accident and it is off airport, you could have a substantial loss of life, and that is a problem. But as far as obstructions, that has not become a major problem, at least as pointed out by the study so far.

Mr. CARNEY. Thank you.

In your testimony you mentioned some of the research and technology programs currently underway that you support and would like to see continued, Mr. Burnett. Are there any programs that you feel are costly and not as productive as you would like and that you would like to discontinue?

Mr. BURNETT. I don't think we have identified any that we would have reason to request that they be discontinued.

Mr. CARNEY. How about the runway conditions program where you are measuring for friction, that type of thing? It has been suggested that the friction on a runway changes so rapidly that we are wasting our time studying that. We should perhaps be studying ways to change the friction of a runway, how to clear a runway, deice a runway, that type of thing rather than being involved in measuring the friction to tell the pilot?

Mr. BURNETT. Well, I think we are in favor of both. We do support runway friction measurement and we support correlating the performance capabilities of the aircraft. Some European airlines are doing that already. I think generally Europe is substantially ahead of us in that area, but certainly we are in favor of better snow removal plans and the kind of research to support that.

Can you add anything?

Mr. LAYNOR. Yes, sir. I would like to add that we are strong supporters and our staff has been participating in the programs that are being conducted by NASA and the FAA in the evaluation of friction-measuring devices and we support the requirements for friction-measuring devices in the context of measuring the friction on a new, dry runway as well as to use it for looking at runways that are contaminated with moisture or snow.

We believe it is essential for maintenance, as Dr. Loeb has mentioned. As the runway is used, the rubber deposits and buildups on the runway destroy the friction which can be developed on that surface. We think periodic evaluation of the runway surface using these types of equipment is necessary.

Further, we would like to get into the area, and we think it is possible we could get into the area to use it for operational purposes to be able to determine when it is necessary to close a runway for cleaning or close an airport, for that matter, based on the actual performance of the airplane.

Mr. CARNEY. Thank you.

Are there areas currently being ignored that you believe should be developed where new technologies might provide for safer operations?

Mr. LAYNOR. Well, I wouldn't categorize them as areas being ignored. There are a lot of research and development activities in progress. I think our concern is with the time it takes to leap from the R&D efforts to the actual implementation of change.

Mr. CARNEY. In view of all the recommendations for FAA to tighten up their standards, has the NTSB made any recommendations for the FAA to tighten their pilot licensing and certification standards?

Mr. BURNETT. Yes; we have. I can't respond specifically to that area. We could provide that for the record.

Mr. CARNEY. The Airport Operators Council International will be testifying here today, and in their testimony, which I had an opportunity to glance over, they mentioned that out of the 885 accidents of air carriers since 1964, only 22 of them were related to the facilities themselves; that is 2.4 percent of the total, and the majority of them were pilot error. Would you concur with that?

Mr. BURNETT. Yes; I think we certainly would concur with the majority of accidents. We don't like to use the term "pilot error" because it is a buzz word. We like to go beyond that to look at the reasons for human performance being causal or a contributing factor to accidents.

Mr. LAYNOR. It is also a somewhat subjective call when you are looking at cause-and-causal factors. Where you may say that an airport didn't contribute to the actual happening of an accident, certainly factors subsequent to the accident occurring could well involve the airport.

For example, the crash-fire-rescue efforts, emergency and disaster planning, and such. Those are all the factors that we are also concerned with, as well as accident causes.

Mr. CARNEY. What you are saying is that under some circumstances, you would have minimized the impact if you had a better facility or you could have provided a facility where under duress a pilot would have a better opportunity to land the plane safely if he had advance warning and could pick and choose facilities?

Mr. LAYNOR. Well, that is certainly true also. The wind shear accident is another example of that. The fact that the technology is not here today to monitor an approach or departure flight path for wind shear kind of alleviates the airport from a causal factor and an accident, but in the future we would like to see the equipment installed at airports wherein a pilot could be told to avoid that situation.

Mr. CARNEY. Might you be saying that because of the technologies available to you, making a determination as to the cause of an accident is like using a Ouija board in many instances?

Mr. LAYNOR. Well, we do the best we can to determine what the factors involved in an accident are. We use flight data recorders, and we would like to see a little bit of flight data and radar data and so forth.

Mr. **Carney**. Are you sometimes pressured into making a decision as to the cause of an accident? Do you feel that you can just say, "Listen, we can't determine the cause?"

Mr. **Burnett**. We do weigh that on occasion and sometimes I think the accident in Kenner, La., is an example where we said the weather was the cause of the accident. Sometimes you can't necessarily trace it back to the performance of either man or machine.

Mr. **Carney**. If I may interrupt, you said at Kenner, the weather was the problem.

Mr. **Burnett**. That is correct.

Mr. **Carney**. Have you ever said "We don't know?"

Mr. **Burnett**. Oh, yes. We haven't in a major since I have been onboard.

Dr. **Loeb**. In majors, we generally are able to get to the causal statement, but perhaps as many as 50 to 100 times a year in aviation accidents overall, we say that the cause is undetermined.

Mr. **Burnett**. To give you an example, we have had a series of personal or business jet accidents in which the crash is from cruise at very high altitudes, and we have no flight data recorder, no cockpit voice recorder to work on. In such instances we say either we don't know or we take an educated guess and point out that that is all it is.

But the Safety Board statute requires us to determine probable cause, and if we think we can arrive at a probability, it is our obligation to say so. We also try to qualify that by saying that is based on less evidence than we would like to have.

Mr. **Carney**. So although it is not a pure science, you feel that your determinations are, in most cases, fairly accurate, and when you can't make a determination, you announce it publicly?

Mr. **Burnett**. That is correct.

Mr. **Carney**. I didn't mean to throw a hand grenade at you, but I think——

Mr. **Burnett**. I was trying to remember what a Ouija board is. It has been a long time since I have seen one.

Mr. **Carney**. With all that is involved in many of these accidents, I sometimes think that the catchword, as you have said, the buzz word sometimes is used more frequently than perhaps it should be, "pilot error" that is.

Overall, if and we are in agreement with the airport operators that facilities are really a small factor in accidents, would you say that the facilities within the United States, within your purview are safe facilities?

Mr. **Burnett**. I don't think that we want to say that facilities are a small factor. Dr. Loeb?

Dr. **Loeb**. I would like to correct one point. Between 1973 and 1981 there were 52 accidents in which air carriers were involved in which the airport, either the facilities or the management, was cited by the Board as a cause or a related factor in the accident. And 9 years prior to that, there were 63 such accidents.

These accidents don't necessarily include overshoot-undershoot accidents. These accidents are those where the airport itself was involved.

Now, there might have been a pilot cited as a cause in one of those accidents as well because we obviously cite more than just one thing if that is the case in a given accident.

Mr. CARNEY. So getting back to the first question, you would dispute somewhat that statistic that was given in that testimony?

Dr. LOEB. Yes; we would.

Mr. CARNEY. Let's just look at the overall situation. I am not trying to point fingers at either the facilities or the pilots. What I am trying to ascertain from you is your general overall opinion as to, I have to go back to facilities because that is what we are looking at today, as to the facilities in the United States, the shape that they are in compared to the rest of the aviation world.

Mr. BURNETT. Well, I think that we can say this. Statistically, and I don't use that to qualify what I am saying, I think we are all aware that major carrier aviation in this country is very safe. It is very safe compared to any other form of transportation. It is safe because we have had a very demanding regulatory program. We have had very careful investigations of accidents. We have incorporated what we have learned in accident investigation into research and development. It is safe because it has been necessary for the market to get people to pay money to fly for it to be safe.

So, when you want to say is it safe, yes, in comparison to other forms of transportation, it is very safe. The only way we can maintain that safety is to continue to try to improve it. There is no plateau on which we can rest on our haunches and say "It is safe enough, we don't have to worry about this anymore." We will quickly find ourselves falling down and the penalty will be paid in lost lives.

Mr. CARNEY. I agree with you, Mr. Chairman, and that is why I asked that question.

There is no doubt in my mind that the reason we called these hearings today is because we have to stay on top of it. We have to try to improve a very impressive safety record and I just wanted to get on the record the fact that I think most people feel that way. I wouldn't want these hearings to discourage anybody from flying. I am sure there will be incidents that will be taken from this hearing and people will say "See how unsafe it is to fly," but overall I think our goal is to make an impressive safety record even more impressive so 2 or 3 years from now when we have an oversight hearing on this same topic, the statistical data will be better.

The performance of aviation in the United States will be improved, and I appreciate the important role that you play in that and that everybody, in fact, who is here today will play in it.

Thank you, Mr. Chairman.

Mr. GLICKMAN. Let me ask a couple of brief questions. It is obviously clear that most airports in this country are not operated by the Federal Government. Only two are?

Mr. BURNETT. Actually that is three, I believe. I learned the other day that they also operate the airport in Atlantic City.

Mr. GLICKMAN. OK. Thank you for the clarification.

I assume as part of your study into airport management and relationship with the FAA there is going to be something to deal with the interface between the private operation of airports and the FAA and how those individual airports make decisions affecting compliance with all the Federal air regulations.

I guess what I am getting at is that I assume that there are management differences, style differences. We had testimony on bad weather and one airport said the first time they had ever closed their operations was this past Christmas. I think that was Denver Stapleton. Yet other airports close somewhat frequently when weather is bad.

This is kind of an interesting dichotomy. We give the FAA the regulation of the airports in this country, but we let them be operated privately. That is a decision we made some time ago and I assume that as part of your study you will deal with some of these issues that I just mentioned?

Mr. BURNETT. Certainly.

Mr. GLICKMAN. Let me ask you a couple of questions about National Airport. If you had been the manager of the airport, would you have fought the construction of buildings like the USA Today Building that is on the north-south approach?

Mr. BURNETT. I don't think that I am in a position to answer that at this time. Hopefully when we are further into our study, I might be, but I certainly couldn't say now that I think that the manager of Washington National Airport was remiss in not doing so, partly because our own recommendations that we have made reflect our belief that adjustments in the published approach procedures could remedy the problem that now exists.

However, I think one building is one thing and 50 buildings is another.

Mr. GLICKMAN. So you are not inviting construction of similar facilities in Rosslyn?

Mr. BURNETT. Not inviting it?

Mr. GLICKMAN. Well, you are not encouraging that, you as the NTSB would not encourage the construction of similar tall buildings on the landing approach?

Mr. BURNETT. I will put it this way. From what I know, I would be hesitant to rent an office on the top floor of some buildings in the Washington area.

Mr. GLICKMAN. OK. We will make sure the NTSB has headquarters in other areas.

One final thing on runway length. There is tremendous deviation in runway lengths between various airports in this country. Obviously some of these airports were built during piston-age operations, like Washington National. Others were designed as jet-age airports. As a part of your study, are you doing any review of the issue of runway length to determine if, in fact, on shorter runways there ought to be modification of traffic or modification of technology to accommodate that kind of traffic?

Dr. LOEB. Well, the answer to the question is yes, and, of course, it is important to understand that aircraft are certificated to go into a given airport based on runway criteria so that the fact that one airport has a shorter runway than another is not necessarily bad. It just means that it might be able to handle smaller aircraft only.

But the answer to your question is yes. We are looking at that specific issue, and we will be addressing it in the study.

Mr. **Glickman**. We thank you for your testimony today. As usual, it was quite productive.

Our next witness is Air Line Pilots Association. We have John O'Brien, the director of the engineering and safety department. Mr. O'Brien, you may come forward. It is a pleasure to have you here. Your entire statement will appear in the record. You may read it or summarize it.

STATEMENT OF JOHN E. O'BRIEN, DIRECTOR, AIR LINE PILOTS ASSOCIATION, ACCOMPANIED BY DAVE HAASE, FIRST OFFICER AND MEMBER, ALPA AIRPORT STANDARDS COMMITTEE; AND BOB DODD, STAFF MEMBER, ENGINEERING DEPARTMENT, ALPA

Mr. **O'Brien**. We will summarize it.

Good morning, Mr. Chairman and members of the subcommittee. I am John O'Brien, director of engineering and air safety for the Air Line Pilots Association. Accompanying me today is first officer Dave Haase, on my left here. He is a member of ALPA's Airport Standards Committee.

On my right is Bob Dodd, staff member of our engineering department. We are testifying today on behalf of 34,000 professional air carrier pilots who fly for 46 airlines. We commend the subcommittee for its ongoing concern about safety of our Nation's airports and appreciate the opportunity to present our views.

Our statement provided for the record covers a wide range of subjects dealing with airport safety and specific information in regard to pilot concerns with problems of bad weather operations, noise abatement, operational criteria, runway conditions, and condition reporting and special problem airports, one of which is Washington National Airport.

With your permission, Mr. Chairman, I would like to have our written statement submitted for the record and I would like to discuss with you the factors that affect airport safety and provide a few examples of airport problems and how we think these problems should be addressed.

First, I would like to state emphatically that Air Line Pilots Association does not consider any of the 400 airports we operate in to be unsafe. On the other hand, there is also no question in my mind that some airports provide a higher margin of safety than others.

A good example of the different levels of airport safety can be found right here in the Washington area. Comparison of the physical layout, the navigation and approach aids and the operational procedures and noise abatement procedures between Washington National Airport, Dulles, and Baltimore-Washington International Airports will very quickly lead to a conclusion that Dulles and BWI are safer airports to operate out of than is National. Our detailed submission to the committee's staff provides much more information on the problems of National Airport.

ALPA does not rate airports. However, the International Federation of Airline Pilots Associations of which ALPA is a member does classify international airports that have noteworthy deficiencies. This airport designation system is limited to international airports.

If problems are found to exist at international airports, they are assigned a star designation. The worst classification an airport could have is a black star designation. This indicates that a critically deficient situation exists at a particular airport. The only airport in the United States which has a black star designation is Los Angeles. The Los Angeles black star is due to the implementation of noise abatement operational procedures which do not provide an adequate margin of safety. A detailed description of the airport starring designation system is provided in our submission for the record.

While on the subject of noise abatement, I want you to know that ALPA is committed to doing whatever is safe to reduce noise. However, noise abatement procedures and operational restrictions are becoming more of a safety concern for pilots operating at many airports around this country.

An example of our noise abatement safety concerns can be found at San Francisco where noise restrictions require aircraft to be maneuvered at very low altitude and this close proximity to mountainous terrain. Another example is Portland where proposed restrictions will seriously tax airport requirements. Here again, we are talking about margins of safety.

Another example of reductions in the margins of safety can be found in parts of the FAA preferential runway uses program. As stated by the FAA, and most pilots I am sure would agree with this, under ideal conditions aircraft takeoffs and landings should be conducted into the wind. However, other considerations, such as noise abatement and other factors, may require aircraft operations to be conducted on runways not directly alined with the wind.

We have no problems with the statement with respect to noise abatement as long as we are operating on clear and dry runways, but we don't think operating on a wet runway with a 45-degree cross wind of 20 knots for noise abatement purposes when another runway is available is as safe as operating on a wet runway which is more closely alined with the direction of the wind. Again, more details on this subject are provided in our statement.

Our submitted statement also contains information on potential airport safety problems related to runway surface conditions and maintenance, construction of tall structures in close proximity to airports and lack of standardization in visual approach aids and availability of crash, fire and rescue services at all the 400 airports we operate into.

After briefly describing some of the problems, I would like to acknowledge the fact that FAA does have work underway in some of these areas that have improved the margin of safety for air operations. One of the more promising efforts is a joint FAA-NASA program, the runway friction measurement program. The FAA also has a review of part 139 underway, which we hope will lead to improvements in some of our previously mentioned problem areas.

However, we are disappointed to learn just last week that the FAA is planning as part of their part 139 review to consider reductions in the requirements for crash, fire, and rescue service at some of our airports. We have also been disappointed by FAA's lack of action in dealing with problems of tall structures around many of our airports.

In 1976, the FAA sponsored a review of the Federal regulations governing the construction of such structures. Despite the fact that there was unanimous industry agreement on proposed changes to these regulations in 1976, there has been no rulemaking action by FAA to date.

ALPA would like to suggest three areas where we think this congressional committee may be able to help to alleviate some of our airport problems.

First, adequate emphasis and funding must be provided for the continuation of the FAA runway friction measurement program. As this effort moves toward measurement of actual airport stopping performance and compares this with the runway conditions identified with the various friction measurement devices, what we are talking about here primarily is funding. As this program moves along, it will become more expensive to support.

Second, a program should be initiated to examine the suitability of visual approach aids under various visability conditions. To accomplish this program, funds should be identified for visual simulators which would be dedicated to this effort. In other words, we think FAA needs a good visual simulator, a research tool that can be used with this program and many others that need to be done.

Third, a program to determine the optimum methods of testing present runways for strength, subsurface integrity and smoothness or evenness. Present methods are an extension of the highway procedures which may not in all cases be applicable to runways. Proper testing methods should save money and close runways during periods of repair.

That is a brief summary of our statement, Mr. Chairman. We are ready to answer any questions you may have.

[The prepared statement of Mr. O'Brien follows:]

STATEMENT OF
JOHN O'BRIEN, DIRECTOR
AIR LINE PILOTS ASSOCIATION
BEFORE THE
SUBCOMMITTEE ON TRANSPORTATION, AVIATION AND MATERIALS
COMMITTEE ON SCIENCE AND TECHNOLOGY
U. S. HOUSE OF REPRESENTATIVES
JULY 18, 1983
AIRPORT SAFETY

Good Morning, Mr. Chairman, and members of the Subcommittee. I am John O'Brien, Director of Engineering and Air Safety for the Air Line Pilots Association. Accompanying me today is First Officer Dave Haase, a TWA pilot and a member of ALPA's Airport Standards Committee. We are testifying today on behalf of 34,000 professional air carrier pilots who fly for 46 airlines. We commend the Subcommittee for its ongoing concern about the safety of our nation's airports, and appreciate the opportunity to present our views.

The discussion of airport safety, including ways to improve present margins of safety, is of vital concern to the members of this Association. Historically, aeronautical research and development efforts have been confined both by government and industry to the development of three of the four elements of the air transportation system, i.e., the aircraft, the national airspace system and the air traffic control system. The fourth element, which is both the starting and ending of the air transportation system, the airport, has been merely reactive, adjusted and readjusted to accommodate improvements and changes in other elements of the total system. Today, we will address those airport safety items which we feel do not meet adequate margins of safety due to inattention by both industry and government.

One area which in years past was a prominent safety problem was the operation of aircraft in bad weather. There has been a reduction in the number of approach and landing accidents over the past few years, but there are times when the airplane/airport interface is adversely affected, sometimes with tragic results, by bad weather.

The most readily apparent example of the influence of bad weather on the safety of airport operations is the accumulation of ice and snow on runways. When snow and ice accumulates on the runway, it reduces the friction available to brake the airplane to a stop after it touches down. A 450,000 pound airplane traveling at 150 mph needs a certain amount of friction available to stop, even on a 10,000 foot runway. If that minimum amount of friction is not available,the airplane will not stop and will leave the runway.

It is the airport operator's responsibility to keep his runways free of ice and snow or to close the airport before it becomes dangerous for aircraft operations. This decision must be based on the judgment of the airport manager, or individual in charge, and numerous other variables such as weather reports, the individuals experience, and present runway friction reports.

Recent incident and accident experience during snow and ice conditions indicates that either the runway cleaning operation is not being done properly or the airport is being left open after the conditions have become dangerous. When these conditions exist, the pilot has no way of knowing the true runway surface condition until he lands.

The pilot must be made aware of the surface conditions and the friction characteristics of that runway if he is to be expected to land his aircraft safely.

The FAA does not presently require standarded procedures for surface condition reporting during snow and ice conditions. Federal Aviation Regulation (FAR) Part 139.69(a), Airport Condition Assessment and Reporting, states that the "Airport . . . must show that it has appropriate procedures for identifying, assessing, and disseminating information to air carrier users of it's airport, by Notices to Airmen or other means acceptable to the Administrator . . . that effect, or may effect, the safe operation of aircraft". FAR Part 139.69(b)(3) further requires that the notification must be done for "the presence and depth of snow, slush, ice, or water on taxiways or runways". These regulations give the airport operator very little guidance on how to disseminate, or gather, the information concerning the condition of the runways. Due to the absence of more detailed instructions to the airport operator, the type and quality of information reaching the pilot concerning runway conditions may vary dramatically from one airport to the next.

The FAA, NASA, ALPA and other members of the aviation industry are involved in a research project which will, when completed, offer a solution to many of the problems discussed above. This project involves the testing of ground vehicles which are designed to measure the friction of various pavements. Up to this point in time these vehicles have only been used to measure runways to determine if maintenance work, such as removing rubber buildup, needs to be done. However, ALPA has encouraged the FAA to test these vehicles to determine if there is a relationship between their friction findings (such as a test run on a snow covered runway) and what an airplane will experience when it lands. The Nordic countries presently use these devices for operational reporting of the runway friction characteristics during snow and ice conditions. The International Civil Aviation Organisation (ICAO) in amendment 36 to Annex 14, Aerodromes, section 2.9.8 recommends that "whenever a runway is affected by snow, slush or ice, and it has not been possible to clear the precipitant fully, the condition of the runway should be assessed, and the braking action measured". It further states that, "The aim is also to achieve the best correlation possible between (friction) test devices and aircraft braking performance".

It is our opinion that this research holds great promise and the FAA should be encouraged to continue their efforts in this area. Adequate development of this technology could be one of the greatest steps to increase the margin of safety during air carrier operations in winter weather.

While runway snow and ice contamination is a serious problem, other types of runway contamination, and the runway condition itself, can pose equally serious problems. Friction measuring devices and their use for maintenance procedures, specifically rubber removal, was mentioned briefly in the preceeding paragraphs. The reason rubber buildup on runways can be problematic is that this too will reduce the amount of friction available for the airplane to stop. The rubber comes from the tires of landing airplanes. As the airplane touches down the tires must accelerate from no rotation to a rotation of approximately 150 miles per hour or greater in less than one second. When this occurs rubber is left on the pavement. When this rubber coated pavement gets wet, as during a rainstorm, it can become as slippery as a snow covered runway making it difficult or impossible to stop. The FAA in FAR Part 139.83, Pavement Areas, paragraph (b) states the airport operator ". . . shall promptly, and as completely as practicable, remove from runway pavement areas on the airport, snow, ice, slush, standing water, mud, dust, sand, loose aggregate, rubber deposits, or other contaminants as required by operational considerations". This requirement, as the requirements in FAR Part 139, does not require any set procedure on how to make this determination that rubber must be removed.

Advisory Circular 150/5320-12, Methods for the Design, Construction, and Maintenance of Skid Resistant Airport Pavement Surfaces, suggests that the airport operator use a friction measuring device to make the determination when the runway should be cleaned. There is no requirement that the airport operator follow the advice in the advisory circular, or if they do test their runway and it does not meet the recommended friction values, there is no requirement that it be cleaned. This produces a difficult situation because the one who will discover that the runway is substandard is the pilot who lands during a heavy rainstorm and finds he cannot stop. An example of the problems with the present FAA requirements are represented by the following excerpts from a letter to the National Transportation Safety Board (NTSB) from Captain John J. Ruddy, ALPA's project coordinator for runway friction projects.

The discussion centers on Washington National's (a FAA owned and operated airport) north/south air carrier runway (18/36). Captain Ruddy states, "Of the 34 runway (friction) tests at DCA from September 1980 through December 1981, 22 (66%) fell below (FAA suggested) criteria for one or more segments . . . one 500-foot segment is more than enough marginal pavement to trigger viscious hydroplaning (loss of friction) and can easily transition to reverted rubber hydroplaning. Once triggered it can continue to very low (5-10 mph) speeds. . . . Considering the short runways, (at Washington National) the airport faces a serious runway friction maintenance challenge".

This example is especially valid and illustrative because Washington National Airport has one of the shortest runways in the country used as the primary air carrier runway. In addition, it has less safety area (runway overrun) than the FAA recommends. This makes the runway friction characteristics of great importance for the safe use of that runway. It is for these reasons that we recommend the standards for runway maintenance, particularly rubber removal, be strengthened with more exact criteria by the FAA. If an airport then choosesnot to clear their runway, they will loose their certification.

Washington National Airport also has problems associated with the approach procedures to Runway 18. These procedures are complex and require a significant amount of aircraft maneuvering close to the ground. Five years ago, ALPA proposed changes to these approach procedures. The FAA in response to these proposals conducted a survey of the National airport area and selected a new site for the approach aids for Runway 18. This relocation involved moving the final approach course which reduced the amount of aircraft maneuvering close to the ground and also provided lower landing minimums for Runway 18. However, these changes were never implemented. In view of this action we found it difficult to understand why FAA rejected the NTSB recommendations concerning improvements to the Runway 18 approach procedures at National Airport.

As the runways become older they can, like the nation's highways, begin to deteriorate. When a runway begins to deteriorate, the FAA requires the airport operator in FAR Part 139.69 (b)(2) to notify the pilots, by NOTAMS (Notices to Airmen) or other means acceptable to the Administrator when there exists "Rough or wavy portions of pavement or safety areas". FAR Part 139.83(a) states, "It (the airport operator) shall promptly repair each crack, hole, or rough area in a runway pavement that exceeds 3 inches across or 3 inches deep". According to these requirements the airport is only required to notify the pilot of rough or wavy areas on the runway and to correct defects only if they are larger than 3 inches. Based on the operational experience of our members, ALPA feels that these standards are too limited to deal with the increasing deterioration of runway surfaces.

ALPA recommends in the ALPA Guide for Airport Standards, section 2.11.7, the following standards for roughness and waviness: "The longitudinal profile of the runway should not exceed:

1) Roughness: + 1/8" per 10 feet measured by straight edge in any direction.

2) Waviness: + 1" per 150 feet measured by prolifometer.

3) Cockpit G loads: Maximum G load imposed on cockpit should not exceed + .25G from a normal 1G.

4) Passenger G load: Maximum G load on passenger compartment in any section of aircraft should not exceed + .1G from normal 1 G."

These recommendations are based on our operational experience. ALPA recommends that the FAA accelerate research in this area with the goal of generating better guidance for the airport operator in the form of requirements in FAR Part 139 on acceptable criteria for determining when runway maintenance should be accomplished.

There are many areas associated with the airport environment that directly affect airport safety although the airport management may have little or noinfluence on these items. One example which has been of great concern to ALPA, and other users of the National Airspace System, is the criteria used to determine if a structure, such as a tower or building, will pose a hazard to air navigation. The FAA has outlined this criteria in FAA Part 77 which is titled Objects Affecting Navigable Airspace. Under this regulation the FAA studies proposed construction of structures which will violate the standards outlined in FAR Part 77. As a result of this study, the FAA will issue a finding of hazard or no hazard to air navigation. Unfortunately, there are a number of problems with this process. First, the obstruction criteria (obstruction plans) outlined in Part 77 do not catch all structures which can prove hazardous. For example, Part 77 looks only at approach paths to a runway for obstacle clearance, not departure paths. An airplane which looses an engine on departure might not be able to clear or avoid the obstacles missed by the Part 77 review.

Secondly, FAR Part 77 review determinations have no enforcement powers. If a determination of hazard is made, the builder can still construct the obstruction knowing that the FAA or the airport operator does not have the ability to stop him without going through litigation.

On June 16, 1977 the FAA published Notice No. 77-7 which gave Advanced Notice of Proposed Rulemaking (ANPRM) concerning FAR Part 77. It was the opinion of the user industry that the FAA was not discharging its responsibilities concerning Part 77 properly or fully. The Commuter Airline Association (CAA), National Air Transport Association (NATA), National Pilots Association (NPA), General Aviation Manufacturers Association (GAA), American Association of Airport Executives (AAAE), National Business Aircraft Association (NBAA), National Association of State Aviation Officials (NASAO), Aircraft Owners and Pilots Association (AOPA), Experimental Aircraft Association (EAA), and the Air Line Pilots Association (ALPA) all jointly signed a letter of concern to the FAA on the ineffectiveness of Part 77 and the hazards of obstructions. They stated in part, "While each of our organizations have addressed individual comments on it (the ANPRM 77-7), this statement is designed to express our collective alarm at the tendency of FAA, reflected in the ANPRM, to abrogate its statutory responsiblities and commitments with respect to objects affecting navigable airspace, as well as safety inflight, and persons and property on the ground". Unfortunately, no substantive changes were made as a result of this review process. As recently as May 1982 this FAA briefed them on the status of FAR Part 77. Four years had passed with noactivity by the FAA. Spring of 1983 still has brought about no changes, only promises from the FAA. We seriously doubt any changes will be made to Part 77 reflecting the user groups concerns until an air carrier aircraft in trouble strikes one of these obstructions and is destroyed. The precedent has been set many times over but still the FAA refuses to acknowledge the need for revisions.

The FAA's lack of regulatory firmness influences many other areas of airport safety which may or may not be under the airports control. An example of the lack of regulatory control reducing the margin of safety of air carrier operations at airports is the proliferation of Visual Approach Slope Indicators (VASI). Air carrier pilots strive for stabilized approaches to landing. If the airplane is stabilized and ready for landing while you are four miles from the airport you can concentrate on landing the airplane. If the pilots are still getting the airplane ready to land two miles from the runway there is less time to concentrate on the landing thereby decreasing the margin of safety. The VASI is an aid which is mounted off to the side of the approach end of the runway which gives the pilot information by colored lights on their glide path above the ground in relation to distance from the runway thereby allowing them to stabilize early on the approach. ALPA recommends the installation of VASI on the approach end of every air carrier runway - the FAA does not require them. Additionally, the FAA does not specify which type is to be used when they are installed.

This results in many different types of systems which are all different in operation and glideslope information presentation. No pilot can possibly learn how each type works. The confusion reduces the margin of safety. Standardization of information presentation is one of the cornerstones of aviation safety. The Air Line Pilots Association, International Civil Aviation Organization (ICAO), and International Federation of Air Line Pilots Associations (IFALPA) recommend only three types of visual approach slope indicators; the standard U.S. 2-bar/3-bar, the Precision Approach Path Indicator (PAPI), and T-VASI. This recommendation is based on operational experience.

We feel the best interests of aviation safety will be served if the FAA would standardized the requirements for VASI.

Throughout this statement, FAR Part 139, Certification and Operations: Land Airports Serving CAB-certificated Air Carriers has been referenced as a regulation which is lacking in firmness. This regulation was designed and introduced in order to standardize air carrier airport safety. Unfortunately, the regulation is so loosely worded that the airport is not given any guidance on how to achieve the goals laid down in the regulation.

An example of the feebleness of the regulation is found in Part 139.45(b)(1) which addresses runway safety areas. (A runway safety area is a prepared area at the end of the runway which should extend at least 1,000 feet. The purpose of this area is to provide a safe emergency overrun area for the airplane if for some reason the airplane can't stop). This part of the regulation doesn't require safety areas, it just describes it as, "a cleared, drained, and graded area abutting the edges of a useable runway and symmetrically located about the runway conforming with FAA criteria at that time".

If an airport was built before the FAA had any criteria (which is only advisory in nature) for runway safety areas in effect then the airport operator is "grandfathered" and will never have to worry about the safety area even if the land is available to construct a safety area. If a safety area was built and FAA advisory criteria was in effect, then the regulation requires him to conform with that criteria. There is presently no requirement for any upgrade of these safety areas at most of our Nation's air carrier airports. Additionally, the regulation does not require airports to maintain painted markings on their runways to any minimum standards, it doesn't even require the airport to have markings. These runway markings provide important information to the pilot. If the markings have faded, then they become increasingly difficult to see in rain, and at night. It is important from a safety point of view to have the painted runway markings in good condition. Since the regulation does not address this item, our pilots are never sure if this information will be available to them at any given airport.

It has been our experience that the FAA air carrier airport safety inspectors very seldom ever write violations to airport operators for non-compliance with FAR Part 139. It would be easy to accuse these individuals of not doing their jobs because we know there are many airports that do not meet the intent of Part 139 but still hold their certification. The real problem is not the inspector, but the regulation itself; it is so loosely worded and constructed that it is difficult for an inspector to determine if a violation is taking place, the regulation provides the inspector with little guidance or framework.

The FAA has announced that it plans to issue an NPRM (Notice of Proposed Rulemaking) dealing with revisions to FAR Part 139. While this might sound like good news, it is our information that the FAA plans to further reduce the requirements in Part 139, specifically with the required crash/fire/rescue (CFR) services, in order to relieve the airport operator of the economic burden of providing this public service. This will be a direct degradation of safety in response to economic and political pressures.

This Association is totally opposed to any reduction in the CFR services at air carrier airports. The FAA required minimum level of CFR service falls far below what the International Civil Aviation Organization (ICAO), National Fire Protection Association (NFPA), and most other countries require.

In our opinion, we feel that this NPRM should address those items in Part 139 which truly affect air carrier airport safety. Included in the revised Part 139 should be requirements for standardized VASI's on all air carrier runways, upgraded and realistic safety areas, friction reporting methods, maintenance methods and criteria, upgraded CFR, better information presentation for taxiing airplanes, and minimum runway marking standards. These are just a few example areas which need to be upgraded, there are many others that were too detailed to address in this statement.

The International Federation of Air Line Pilots Associations (IFALPA) classifies unsafe international airports by assigning stars to these airports. An orange star is assigned if an airport is deemed deficient. This is not critical but the airport does have characteristics that substantially reduce the safety of operations. A red star is assigned if the airport is seriously deficient. In this case, a procedure or runway, etc. poses a real hazard which could cause an accident. Finally, a black star is assigned to those airports deemed to be critically deficient. These airports have critical safety problems which need to be corrected as soon as possible.

This type of ranking is not done with domestic air carrier airports, however, if it was we would find a broad range of the margin of safety at our air carrier airports. In this country, the purpose and intent of FAR Part 139 was to standardize the air carrier airports to reduce the differences in safety levels between airports. The original regulation did not accomplish this. The new regulation, if further weakened will certainly not accomplish this. FAR Part 139 if properly constructed and enforced would do the most, by a wide margin, to increase airport safety at all our air carrier airports. The FAA has the ability and the responsibility to do so. We would like to see Congress encourage them to do so.

This statement was not intended to incriminate the airport operators and managers throughout our country. The vast majority are professionals with an interest in the safety of operations at their airport, however, they are managers who deal in the very real economic world and will do what is required by the FAA. In our opinion it is the FAA's responsibility to ensure that airport safety is accomplished and maintained, the best way to do this is through well defined regulations. The FAA controls and regulates to great depth all other aspects of the air transport system, from pilots and mechanics, to air traffic controllers and airway facilities. As we stated in the beginning of our statement, the airport is where every trip starts and finishes, to ignore this element of the total air transport system is to invite disaster.

Mr. GLICKMAN. Thank you for your testimony, Mr. O'Brien.

I would like to ask you, in your statement, you talk about three or four airports specifically, but before I get to that, you talk about Los Angeles International is the only airport to have a black star and that is because of reduced power for noise abatement?

Mr. O'BRIEN. That is the only U.S. domestic airport to have a black star. There are several others around the world, and it is primarily because of opposite direction noise abatement procedures implemented during the night hours in Los Angeles. You take off to the West and land toward the east over the water. We don't think opposite direction traffic is the safest way to go.

Mr. GLICKMAN. Do they do that simultaneously? Are we taking off to the West and landing at the east at the same time?

Mr. O'BRIEN. That is correct. There were two sets of two parallel runways at Los Angeles, and the north set may be used for takeoffs and the south set for landings, or vice versa, depending on the traffic.

Mr. GLICKMAN. And how far are the runways apart from each other in lateral distance, a half mile?

Mr. O'BRIEN. The sets of parallel runways are much closer than that, but between the two sets there is more than a half mile. It is closer to a mile.

Mr. GLICKMAN. So, when you are landing, you may be looking at the lights of a plane taking off just a little bit to the right or left of you then?

Mr. O'BRIEN. That is correct, and there are other operational problems entailed with that.

Mr. GLICKMAN. I understand that also occurs at Boston Logan Airport where you may have planes landing and taking off in the same direction on occasion?

Mr. O'BRIEN. Boston Logan has a little different kind of a problem. They have a noise abatement scatter plan there which is set up by a computer and it is to alleviate the noise around particular sensitive areas so you could run into a situation at Boston, depending on weather conditions and the amount of traffic using a particular runway time, where the computer would suggest that you use these two runways or this particular runway for takeoffs and this one for landing.

The tower chief at Boston has the option of deciding or electing to do that based upon the conditions. We are much happier with that proposal or that way of doing business at Boston than we are with what is happening in Los Angeles.

Mr. GLICKMAN. I yield.

Mr. CARNEY. Going back to the Los Angeles Airport, sir, do they land and take off on the runways that are right next to each other, or is it required that you have that mile space in between?

Mr. O'BRIEN. The mile space in between is required, the horizontal separation. The two sets of closely spaced parallels are used for takeoffs and the other sets of closely spaced takeoffs are used for landings, so you have on one side, if you are familiar with Los Angeles Airport, you have the terminal buildings and two sets of parallels on each side. One set would be takeoff, and the other set would be landing.

Mr. GLICKMAN. But they are all parallel runways, correct?

Mr. O'BRIEN. That is correct.

Mr. CARNEY. But the takeoffs would be separated from the landing by the airport in between? They would take off from both runways; they can do that with a time separation, and they would also land on the other two with a time separation, with a mile plus in between?

Mr. O'BRIEN. That is right.

Mr. GLICKMAN. What airports in the U.S. have other color stars? What do the colors mean, first of all?

Mr. O'BRIEN. There is an orange star rating, which is the least, shall we say, concern in the area of degradation of safety, and red, which is halfway between the orange and black.

Let me just run back from memory here. Boston Logan, for example, had a black star rating similar to Los Angeles because of noise abatement procedures. When that black star rating was applied at Boston, the insurance companies decided that they would talk to Massachusetts Port Authority to see if something could be worked out. I understand, after some pressure from the insurer, the Massachusetts Port Authority, decided to change some of the proposed procedures they wanted to implement there and the black star rating was removed.

Mr. GLICKMAN. So where are we, orange star now?

Mr. O'BRIEN. A no star rating at Boston.

Mr. GLICKMAN. No star at all?

Mr. O'BRIEN. Anchorage had, I think, a red star rating. That star was used to indicate a deficiency in runway location at Anchorage.

There is a situation of crosswind conditions and light airplane traffic that was unique to that particular airport. With the proposed construction—and I am not sure, maybe the construction is completed now, of an additional runway at Anchorage—that star rating will be removed.

Portland has one having to do with visual approach aides.

There are several airports outside of the domestic United States that the United States has oversight responsibility for, the Virgin Islands, St. Thomas, and a black star for a long period of time. That will be removed because of the extension of the runway at St. Thomas and the slight change in direction. In fact, they are moving part of a mountain there to make procedures a little bit safer.

Pago Pago, which is another U.S. trust area, has a star rating because of deficiency in approach.

Domestically, in the United States, the only star rating that presently exists is Los Angeles.

Mr. GLICKMAN. Let me ask you this. Would Washington National get a star if it were an international airport?

Mr. O'BRIEN. I would think so. The way the system works is that the pilot group responsible for reviewing airports in a particular country make recommendations to IFALPA. I think that if we had presented the recommendations that we made to FAA to IFALPA they would have looked at those and probably assigned a star rating to National.

Mr. GLICKMAN. Again, what specifically are those recommendations that you made on Washington National?

Mr. O'BRIEN. We have made a wide range of recommendations on National.

After the Air Florida accident, there was a special NTSB group that looked at National just from the airport side. We participated in that group and submitted a special report to the NTSB, and through the NTSB to the FAA. A copy of that has been provided to the committee staff.

I will give you a few examples of the kind of things that are utmost in our minds at National.

The approach down the river that you heard about earlier this morning, back in 1978 we recommended to FAA that some specific changes be made to that approach procedure.

As a result of those recommendations, FAA looked at the overall approach procedure situation from the north down the river, and did an internal staff study and looked at relocating the localizer over at Bolling Air Force Base. They actually put a mobile localizer over there, I understand, and did some testing, and working with Eastern Air Lines in Miami, flew some simulator approaches on this new procedure.

In our opinion, it is a much safer procedure. It only requires one turn on the final and gives you precision approach guidance down to around the 14th Street Bridge and also provided lower minimums at National. It had more flexibility for the operators getting in and out of there.

Now, that recommendation and study that FAA performed, I understand has been shelved because it was really intended to try to get wide-bodied airplanes to National Airport.

I think overall operations would have been improved if they had gone ahead and implemented that proposal.

Dave Haase here on my left is an active line pilot and flies into National occasionally. He may wish to add something on National.

Mr. HAASE. I would think that with respect to the approach that we presently fly into runway 18 at National Airport, it is the most difficult approach we fly anywhere on our airline systems to a primary air carrier runway, particularly under conditions of low ceilings and poor visibility.

It has not only high minimums but it lacks the instrument electronic vertical guidance for the later stages of the approach. It is basically an approach to visual conditions, and from there on you try to fly the river or various landmarks in order to find the runway at the airport.

It is something that really, from the air carrier pilot standpoint, is a deficient approach. It is marginal.

Mr. GLICKMAN. Do you recommend lengthening that runway 18, the north-south runway?

Mr. O'BRIEN. It is not so much lengthening the runway as it is providing the safety areas at the end of the runway should some misfortune take place on a takeoff or landing.

Mr. GLICKMAN. You mean an overrun?

Mr. HAASE. Yes, sir.

Mr. GLICKMAN. Will an MLS resolve the southbound approach system, a microwave landing system?

Mr. HAASE. I think there is some very real potential for using an MLS on runway 18.

Mr. GLICKMAN. In your statement, Mr. O'Brien, you talked a little bit I think about hydroplaning, which could result with quite a bit of precipitation on the runway and the shortness of the runway at National.

Have you ever experienced, Captain, any hydroplaning at National Airport's runway 18 in bad weather?

Mr. Haase. There were a couple of times when it seemed as though the braking action was not what you would normally expect on a wet pavement with a grooved runway.

We really don't know what the answer to that particular situation was, but there was definitely an indication to us that the airplane was not decelerating as we would normally expect.

Mr. Glickman. And without that additional overrun it becomes a serious safety problem?

Mr. Haase. Absolutely. At the south end of the airport, if you are landing to the south, the approach light system to the north are effectively just like tin can-openers and something that needs to be addressed.

If there is a safety area there of an appropriate length, then there is room for an airplane to get stopped should it go beyond the length of the runway. The same thing if we are landing or taking off to the north.

In that section just off the end of the runway, if it could be filled in to provide a safety area, we could eliminate a major hazard.

Mr. Glickman. What is the length of the current overrun at the airport, do you know?

Mr. O'Brien. I don't think we can tell you specifically. I think there is around 200 feet of surface going toward the north.

Mr. Glickman. It is practically negligible, isn't it, compared to other airports?

Mr. Haase. That is correct.

Mr. Glickman. What length does the FAA currently recommend for an overrun?

Mr. O'Brien. There is a safety area and there is an overrun. There is 200 feet of safety area and 1,000 feet of overrun. We would much prefer to see a 1,000-foot overrun at the end of all runways served by air carriers.

Mr. Glickman. Are you aware that they use other runways besides the north-south runway to take off on—the 727's and DC-9's on occasion?

I assume that it is because of wind conditions at that airport.

There is not a lot of flexibility on those runways?

Mr. Haase. It is partly due to wind conditions. It is also partly due to the traffic acceptance rate at the airport.

For instance, during peak times, if you are taking off to the north, departing aircraft generally require greater runway length than landing aircraft. Departures would be made on runway 36. Particularly if the wind is out of the northwest, landings could be made on 33.

Mr. Glickman. Those runways are both under 6,000 feet apiece, aren't they, those two cross runways?

Mr. Haase. Certainly 36 is close to 6,000, yes.

Mr. Glickman. I am going to ask you a bit about some of the other airports because they may be indicative of some of the problems.

At San Francisco you state an example of our noise abatement safety concerns can be found at San Francisco, where noise restrictions require the aircraft to be maneuvered at very low altitudes and close proximity to mountainous terrains.

I wonder if you could require specifically what that would require on a takeoff?

Mr. O'Brien. There are two problems at San Francisco that came about because of noise concerns and because of terrain problems with close proximity to the airport. They are made a little bit more complex because of some construction work that is going on there, tall structures very close to the airport.

Taking off to the west at San Francisco, for noise abatement purposes, you are required to make a turn to the right immediately upon takeoff. This is primarily a noise abatement requirement.

The problem there is that a lot of departures out of San Francisco are international, very heavy fuel weight cargo and passengers, and maneuvering the airplane in close proximity to the ground at that weight is not the most ideal situation.

Also, when you make this right turn going to the west out of San Francisco, Mount San Bruno is right there in front of you. It is not too bad during the daytime because you can see it, and obviously you don't want to run into it. At night, the mountain is not lit. There are no obstruction lights on it.

Also, to complicate that a little bit further, at San Francisco during certain times of the year, you have wind and temperature situations that adversely impact aircraft performance, for all these reasons we have suggested that, No. 1, some obstruction lights be put on the mountain, a remote weather station be located on the top of the mountain so you get some actual wind and temperature conditions, and this information be provided to the pilot on a real time basis, and let the captain elect whether or not he was going to make this noise abatement procedure an option.

So far we have got the remote weather sensing unit actually installed. We are trying to get real time information from it.

We understand there is a program investigating the feasibility of putting some obstruction lights on the mountain. When these two things get into operation, this will be much safer, in our opinion, than it is today.

We are not saying that it is unsafe. We are just saying it is one more thing in a complex number of things that you have to consider every time you operate.

There is another problem in San Francisco: its takeoffs to the south. Because of mountainous terrain and, again, noise, you must make an immediate left turn on this particular runway. There are two hotels that are planned to be constructed very close to San Francisco Airport. Those hotels will be right in the flight path of airplanes turning to the left as soon as they take off.

The problem here is that under today's Federal regulations, the FAA must conduct a review to determine whether those proposed structures will be a hazard or not. However, the regulations don't cover or the criteria does not cover, turning departures off of runways. So, therefore, you don't have to do the same kind—or let me turn that around.

The FAA is unable to make the same kind of evaluation on those proposed structures that they would have been able to make if they were located in a straight-out departure area.

Mr. **Glickman**. So that is the limit of FAA's regulatory power to prevent construction of structures directly in line with the end of the runway.

Mr. **O'Brien**. Part 77 of the FAR covers that particular aspect of construction; it does not cover turning departures.

There are other provisions. There are procedures for instrument departure procedures, called terminal instrument procedures. When you look at the Terps, those are pure operational procedures. They are not to identify structures. They provide criteria for the airplane operator to have a safe clearance of a structure that may already be there.

You can use this criteria to look at structures and then say, OK, we know the structure is there. We will require the pilot to either see and avoid this structure or put some visibility minimums on operations on that runway which will allow him to see the structure.

It does not do anything to the builder. It does not allow or give him notice that his proposed structure is safe, or indeed, can potentially be a hazard. It puts all the responsibility again back on the airline to offload payload to clear those structures, or the pilot to see and avoid those structures.

Mr. **Glickman**. Airport areas are extremely attractive in terms of development and I think that they do present potential safety problems.

I think that your organization as well as others ought to insure that you do whatever you can—and I am sure you do—to notify the FAA as well as congressional committees up here when those kind of structures do present safety problems.

The real unfortunate problem we get is a situation like at Washington National where the airport was built so long ago that I gather that we never even made much of an effort to realize this problem until 10, 12, 15 years ago. By then it was probably too late.

Mr. **O'Brien**. The problem again at runway 18 at National is that you are required to make so many manuevers in close proximity to the ground. You don't have a straight-in approach procedure to fly.

So even though there are buildings at National that do not violate the present FAA criteria for construction, identification of hazardous and Terps procedures, the fact that you are manuevering under sometimes adverse weather conditions, and the fact that the particular procedures on nonprecession approach to runway 18 requires you to see the runway.

And then, once you see the runway, you may descend below your minimum descent height and get into the airport. It is almost an invitation to do as much as you can to make that airport. And there are times when under crosswind conditions, when the airplane is going to wander to one side or the other of the river.

Mr. **Glickman**. Does it make you want to descend to a lower altitude in order to see that runway?

Mr. **O'Brien**. No. When you have reached your minimum descent altitude you can not descend any further. Once you see the runway, though, you are by regulation allowed to descend below that altitude, and it is up to you to maintain sight of that runway or else you are going to have to execute a missed approach.

So once you are flying along the minimum descent altitude and you see the runway and start descending, your prime concentration is maintaining sight of that runway and maneuvering your airplane so that you can execute a stabilized approach to that runway.

Mr. GLICKMAN. Let me go to a couple of larger questions.

Your members fly in and out of every airport in the country. Dulles and National are FAA-operated airports. Are there differences in your experience in the way they are operated and the way other non-FAA airports are operated?

Mr. O'BRIEN. There are differences between a lot of airports and the way they are operated.

I don't think it would be fair to categorize the difference between Dulles and National and a number of other airports, because there are so many differences between so many different airports that I don't think we can point to something that is federally operated and say that this is unique.

Mr. GLICKMAN. Give the committee some of the differences that you face at different airports in terms of how they are operated, in terms of landing and takeoff conditions or ground conditions, that the airports have some discretion on.

I would like to know, for example, does Dallas-Fort Worth do something differently than Chicago-O'Hare but unrelated to, let's say, FAA operating procedures that might affect the safety of the airports?

Mr. HAASE. There are definite differences in wintertime conditions as to whether a runway is open or closed between airports in the northern part of the countryside. Some of it seems to be demand related. Some airports are able to stay open longer because there is a lot of traffic, even though in many conditions, the operating surfaces are marginal.

At an airport where the traffic demand is lower, the opportunity presents itself to close that runway and get it cleaned off to the friction level desired.

We see differences in signs at airports in terms of pavement markings and the maintenance of those markings. In some cases, they are maintained very well. In other cases, not at all.

If you look at rubber removal from runways, some airports have excellent programs for rubber removal and others don't seem to have a planned approach. Their action is to remove the rubber only when appropriate pressure is brought to bear.

These are some of the differences that we see.

Mr. O'BRIEN. All those differences we hope to have somewhat standardized by straightening up FAR part 139.

In the meeting that FAA had last week, they took a step in this direction and we hope that working closely with the FAA and airport operators here that we can probably standardize some of the conditions we find that Dave has just mentioned.

Mr. GLICKMAN. Well, again, if I am flying into an airport that is faced with snow and ice, I sure as heck want to know that there is some standardization so that at least I have some confidence that the same high standards at one airport will be duplicated by another airport.

Otherwise, I am at the mercy of that particular airport that, for whatever reason, whether it is traffic, financial or other reasons, may not have the incentive to do the cleanup like the first airport does. That is not only unfair, but it is unsafe to the flying public.

In any event, I appreciate your testimony very much.

Mr. Carney.

Mr. CARNEY. Mr. Chairman, I think you have asked most of the questions that I have been thinking of.

I would like to give you, Mr. O'Brien, an opportunity to respond to a question I asked earlier.

Do you feel that the ability to ascertain reasons for incidents or accidents at airports is such that they can actually identify the reasons with good reliability?

Mr. O'BRIEN. Yes. I think there is enough information available any time you have an air carrier incident or accident to look very closely at the facilities of a particular airport and see what role they may have played in that accident.

I think that the NTSB people who preceded us here captured exactly the way we feel in that there are probably many accidents where the probable cause has been laid in the lap of the pilot, but contributing factors to those accidents were the facilities at a particular airport or procedures used at a particular airport.

We are not trying to point the finger at an airport and say that is the cause, but I think that if you look past the stated probable cause and contributing factors, you are going to find a lot of airport facilities or procedures identified by NTSB as part of the reason behind an accident.

Mr. CARNEY. We are certainly not trying to identify blame or anything. What we are trying to do, as I said before, is to improve the situation at airports and improve the entire safety record of our aviation industry which, as I also said earlier, is a good record, that we ought to work hard to make better.

You mentioned, and I asked the other witness about, the friction program. Throughout your testimony, you refer to the friction program and I would make the assumption that your association is very favorably disposed to that program; is that correct?

Mr. O'BRIEN. I think that is probably a very good way to state it. We are very favorably disposed to that program.

In fact, we have spent an awful lot of time and effort making sure that that program got started and making sure that all those people who should be involved in the program did, indeed, participate in developing the criteria under which we are going to operate the program.

We have some concern now, though, that the program be properly funded and adequate resources be made available for the program. We have done an awful lot of work.

We have got a lot of data out of the program already but, for example, this year I think there is $400,000 allocated to the program. For something as important as this program is, and as fruitful as it could be, we sure feel that more than $400,000 should be allocated. It is going to require more than that when we get into actually testing some aircraft.

I know Lockheed has suggested that it would make the 1011 available to NASA and FAA to do some actual correlation between the various friction devices and actual stopping distances, but once you get into aircraft testing, that is an expensive proposition.

Mr. CARNEY. I fully appreciate that.

My next question has to do with the same friction program. It has been said that conditions change so rapidly that it would be impossible to give good data to you as a pilot approaching an airport.

Do you think that might have an adverse effect on your ability to understand the present conditions?

Mr. O'BRIEN. Obviously I can't sit here and tell you that conditions don't change very rapidly. They do.

In that case, probably the best information we can get, is from the pilot reports, from preceding aircraft. However, there is lack of standardization in that kind of information today. A lot of it is subjective.

If we had a better understanding as to how various airplanes perform under certain conditions, and we can get this kind of data from the program we talked about earlier, then the report of an L-1011 pilot or a DC-9 pilot would mean much more to me, if I were following that particular aircraft.

Again, it is good information when conditions are changing, but we can do a lot to improve that information.

Mr. CARNEY. Having the information is only good if you know what to do with it, I guess is what you are saying.

By continuing to study the performance of various aircraft under different runway conditions, this would allow you, as an incoming pilot, to adjust with some intelligence, by saying, well, we know that L-1011 will respond this way to this type of surface. So you make your adjustment. That type of information would be timely because you would be getting it from pilots in front of you coming in.

Mr. O'BRIEN. You have captured the situation adequately. Today some airlines do have recommended procedures for pilots to use depending upon friction measurement information.

Some airports do provide this information, but again, today it is not standardized and it is rather subjective. We would just like to make it a little bit more precise. We can do this through this program.

Mr. CARNEY. Thank you.

Finally, the question that I asked before of the National Transportation Safety Board I will ask of you.

You make many recommendations, and we are pleased that you do, for the FAA to tighten regulations and do this and do that. Do you recommend that they tighten the regulations on the licensing and performance of pilots?

Mr. O'BRIEN. We have continually worked with FAA and also with NTSB in this area. In fact, we were the prime movers behind the LOFT program, which is line-oriented flight training, and it goes into much more of the operational problems that pilots run into on a regular basis.

Most of the major air carriers have adopted some version of this LOFT program as part of their training programs.

Again, we are continuously striving to bring more operational real-world situations into the training programs of the various air carriers. We are very supportive of very stringent training requirements for pilots. It is one of the most productive means of improving operational safety.

Mr. **Carney**. I did say that was my last question, but the thought occurred to me before, I was somewhat confused when you were talking about the extension of runways for safety and someone said you would like 1,000 feet, that safety area.

Mr. **O'Brien**. That is right.

Mr. **Carney**. It seemed to me that you were saying that you would have to put it on both ends. You take 18 and 36.

Is that true you would have to put 1,000 on the end of 18?

Mr. **O'Brien**. That is correct, and part of the FAA recommended criteria is that you have 1,000 feet on each runway end.

Mr. **Carney**. I am confused now, I must admit. You have a 6,900-foot runway and you need 1,000 feet of safety. So you add 1,000 feet on the southern end of it.

Now you have a 7,900-foot runway, no?

Mr. **O'Brien**. Not quite. I wish we did, but we don't. All you do is have a prepared surface.

For example, at the north end of runway 36 or 18, if you had 1,000 feet of overrun there, Roach's Run would not be there. You would have a prepared surface. It might not be paved. It may be just a grass surface or could be paved.

Anyway, you would not have Roach's Run there if you had a 1,000-foot runway overrun area.

Mr. **Carney**. I see.

If you put a prepared runway and designated it as a 1,000-foot safety area, would that answer the question?

I am not a pilot, you must understand that, but I would think if you have a 7,000-foot runway and you add 1,000 feet to it for safety, you can paint your markers or something saying this is the runway and this is the safety area and do that on the opposite end.

Mr. **O'Brien**. You could do a lot of things there. We would like to have the full use of the paved runway for takeoff and landing and then 1,000 feet beyond the paved runway is a prepared overrun area.

Now, one consideration, the cost of providing a 1,000-foot overrun where you don't have a prepared surface today is significant but not nearly as significant as it would be to build an extended asphalt or concrete runway.

So for the situations we talked about earlier, hydroplaning or inadequate braking, by having this 1,000-foot overrun area at the end of the runway, if the airplane happened to go past the end of the runway, you would come to a stop safely. You would not run into the water or go off the end of the runway and possibly cause some damage to the aircraft, and in the worst possible case, have some fatalities.

So we are looking for a prepared area off the end of the runway in case there is an incident that requires it.

Mr. **Carney**. Does the different characterization of a prepared area at the end of a runway make it more conducive for a plane to stop? Is that what you are saying?

Mr. **O'Brien**. There are a lot of proposals out there to prepare this overrun area in different ways.

The British have done a lot of work in this area. In fact, they have used a substance that looks like Styrofoam where you just put it out there and the airplane would run into it and slow it down. It is almost like running into mud off the end of the runway.

Obviously, a mud area off the end of the runway would be beneficial, too.

Mr. **Carney**. Now I can understand, yes.

Mr. **O'Brien**. What you are looking for is to eliminate natural hazards that may be in there: A dike, a seawall, or trees, you name it.

We want a 1,000-foot cleared area off the end of this paved surface so in case you have a situation where the plane goes off.

Mr. **Carney**. I certainly appreciate that. I thought that perhaps by just making the runways longer, you would accomplish that, but you don't. And I did not understand that.

Mr. **O'Brien**. Well, if you made the runway longer, you would have a bigger airplane and load it up heavier and just take advantage of that longer runway so you are back to the same problem.

Mr. **Carney**. That was the question I was trying to get at.

You are saying we probably don't have the discipline. If we build them longer, we would allow bigger and heavier loads coming in and taking off.

So you actually feel it is prudent to make the safety areas of a different design so it can't be considered runway space for that reason. And also the economics; as you say, it is probably less expensive to do that. And the third reason, if you make it of a medium such as that it would have a greater capability of slowing down a plane and bringing it to a safe stop, that would be the preferred way to have those safety areas.

Mr. **O'Brien**. That is correct.

Mr. **Carney**. I apologize for asking so many questions there, but it was not clear in my mind. And not being a pilot, I was trying to get an understanding.

Mr. **O'Brien**. That is probably my fault.

Mr. **Carney**. No, no, not at all.

Thank you, Mr. Chairman.

Mr. **Glickman**. Just two quick questions. One, I think it is clear that what you are saying is that the FAA recommendations for overrun are not being followed at their own airport, Washington National?

Mr. **O'Brien**. Yes, their own recommendations.

Mr. **Glickman**. Just in summary, you indicated, I think it was you who said, there were 400 operating airports in this country.

You would not be flying into them if you judged them unsafe, is that correct?

Mr. **O'Brien**. That is correct. That 400 number came about through our examination of the airports that we operate into.

We have an airport liaison program that Dave Haase is responsible for, that goes around and actually looks at these airports and helps the airport operator to make improvements. So the 400 airports I referred to are just those airports that we operate into.

Mr. **Carney**. If I may throw in the old hand grenade question again, are you under any pressures as pilots to land under conditions such that you would perhaps make a judgment not to land?

If you were coming into National—you, sir, fly into National on occasion, you said. Do you come into National and make your radio electronic communications with the ground and say, "Look, I don't like the situation." They are telling you, "No, it is not that bad; you have minimums. Come on in." And you would rather say, "I don't want to bring it in and I will land it over at Dulles or BWI"?

Are you under pressure to bring it in not only from the standpoint of the airport itself of telling you to bring it in; your airline trying to maintain a record so they can put an ad on television saying "we have a 95 percent on-time performance," or would you be under peer pressure to say that "Jim never lands the thing under minimum," that type of thing?

Mr. **O'Brien**. We could give you the very easy answer. Of course we are not under any pressure. We have the regulations, captain's authority, and we are going to exercise that authority.

While Dave is thinking about a proper response to that question, let me add a couple of things.

We look at airport operations. We look at various equipment types that operate into these airports. We, as an association, have taken action in the past and said we are just not going to operate this particular piece of equipment at that airport. Sometimes that action is taken by individual pilot groups and sometimes on an association-wide basis.

I don't want to get into names of airports and particular carriers at this time. We could supply something for the record later.

But there are pieces of equipment that we will not operate under certain weather conditions at certain airports today, period, and that is an association position. That position has been supported fairly firmly by some pilots.

Mr. **Glickman**. When you say pieces of equipment, you mean larger airplanes?

Mr. **O'Brien**. Aircraft types, right.

Mr. **Carney**. I recognize, and I believe that, indeed, you are the ultimate decisionmaker. You are the captain of the aircraft and you are in charge.

There is no doubt in my mind about that. I am simply saying even under those circumstances, are you under pressure, whether it be peer pressure or airline ownership pressure or whatever? In your thought processes do you ever say——

Mr. **Haase**. Let me see if I can respond to that a little bit for you.

I would have to say just based on my own experience, no. In fact, I think the pressure would be the other direction. If things are not right, do something else, go someplace else and I think these are the standards that most of the carriers in the United States have.

I can't speak for some of the newer carriers, some of the newer operations. I think there may be variations, but from my own experience, I think most of your major carriers have very high standards and that type of pressure is there.

Peer pressure to some extent, it might be there, but I really don't think in this day and in this environment that we have the same situation as we might have had in the past.

No. I don't see that.

Mr. Carney. Thank you very much.

Mr. Glickman. I wanted to ask two questions. When we are talking about the safety of airports in this country, the airports and air carriers fly into, it is a little bit like in George Orwell's "1984" when he said all people are equal but some are more equal than others.

You are saying all airports are safe, but some are safer than others?

Mr. O'Brien. I guess it is a margin of safety we are talking about there. There are FAA minimum standards and in some places those minimum standards are exceeded, and when they are exceeded, your margin of operating safety is going to be improved.

What we are saying is that we are doing our best to make sure that there is a margin of safety available to us and we want to make that margin as great as possible.

Mr. Glickman. But in some airports in this country, the margins are not as great as in other airports?

Mr. O'Brien. Yes; and the case in point was Washington National when you compare that to Dulles and BWI. There is no question in my mind that the margin of safety for operations into Dulles and BWI is greater than that for operating into National.

Mr. Glickman. Is the financial situation of airlines having an impact on safety? As long as I have you up here, I might as well ask you that question.

Mr. O'Brien. I can't give you specific examples. We can give you a subjective opinion. I talked about margins of safety before. The FAA is required under the 1958 Aviation Act to provide a minimum standard for safety.

The airlines under that same act are encouraged to have the highest level of safety possible.

Now, to provide that highest level of safety is going to cost a certain amount of money and obviously if you are in poor economic shape, and there are some carriers today who are in poor economic shape, you may not be able to, even if you are willing and want to provide that extra margin of safety. You are going to fall back to the minimum level required by law.

We think that under those circumstances, operating in that manner is not as safe as operating when you have a good financial basis and are able to provide that extra margin of safety.

So again—excuse me for beating around the bush on you. I guess the short answer to your question is that we feel that deregulation today has spawned a situation that has promoted a condition where the highest level of safety is not available to us and all the operators.

Mr. Glickman. One final question. The question of ontime weather information. One of my concerns has been for some time that aircraft have been vectored into bad weather in or around airports because of traffic and because of collateral things, and we had a situation sometime ago where I believe there was a Southern

Airways crash that for whatever reason was vectored into a thunderstorm.

FAA has, at least, been telling us and has been making some progress on updating their weather reporting capability. Do you believe there has been improvement in terms of relaying of ontime weather information to you all in the cockpit?

Mr. O'BRIEN. Sadly to say, no. We are aware that the FAA has programs underway which are intended to provide better and quicker dissemination of weather information and Neal Blake, I understand who will follow me here, is in charge of weather systems office for FAA, which was set up very recently. Neal and his people have a significant task just to get hold of all the various weather programs that are going on and try to make some sense out of those programs and provide a product from all those programs that is more beneficial to the pilots.

Now, there have been several improvements going on. The air traffic control centers have weather radar information in them now and there are some specially trained people at some of these sites to provide this information to controllers who then pass it on to the pilots.

Those are good and positive things, but even under most ideal circumstances with the new information available in the centers, the information does not get there fast enough and the information really is not adequate because today we are operating more and more flights under more crowded conditions and there is more competition and so, therefore, there is a greater chance of running into some adverse weather conditions.

We need better information and a quicker format to maintain this safety record that we are proud of today.

Mr. GLICKMAN. I think that is a very high priority. I can't tell you the number of times pilots have told me that the information they get at the time they leave is dated when given to them at the airport and, of course, it is very, very dated by the time they get near their destination.

Some places are better than others, and I know this is a high priority internally within the FAA. I am disappointed not to hear you say that for yourself. The fact is that this has been one of the primary thrusts of the committee, that of improving technology and getting you weather information on time and better quality information than we had before. This is something, I guess, we will have to continue to work on rather aggressively.

Mr. O'BRIEN. That is correct. The FAA has several programs underway and I am sure you will hear about them today and we are very encouraged by the potential results from many of those programs, but we still have a problem, a real time problem today of getting good information and many aspects of that problem could be addressed by procedural changes, how we disseminate that information.

We are not going to need a whole new weather radar system to make some changes that could be done today.

Mr. CARNEY. Thank you very much for very informative testimony.

Mr. GLICKMAN. We appreciate your testimony very much.

Our next witness is Neal Blake, Deputy Associate Administrator of the FAA. Neal, you probably have some folks you want to have sit up here with you. Besides your formal testimony, Neal, which entire testimony will be included for the record, if you feel like you might want to respond to some of the things that have been said, that would be fine, too.

STATEMENT OF NEAL BLAKE, DEPUTY ASSOCIATE ADMINISTRATOR, ENGINEERING AND LOGISTICS, FEDERAL AVIATION ADMINISTRATION, ACCOMPANIED BY CHIP MUDD, DIRECTOR OF THE OFFICE OF AIRPORT STANDARDS; AND KEN HUNT, DIRECTOR OF THE OFFICE OF FLIGHT OPERATIONS

Mr. **Blake.** Mr. Chairman, and members of the subcommittee, I would like to read a portion of the testimony that we have submitted for the record, particularly those parts that address some of the questions that were raised earlier.

I welcome the opportunity to be here today to discuss FAA's efforts to apply new technology to airport safety. With me are Chip Mudd, Director of the Office of Airport Standards, and Ken Hunt, Director of the Office of Flight Operations.

FAA carries out its duty to insure airport safety through two main regulatory functions: Airport certification, and the establishment of flight operations criteria. Currently, the law empowers the Administrator to issue airport operating certificates and set minimum safety standards for the operation of airports serving air carrier aircraft designed for more than 30 seats.

FAA's Airport Standards Office sets the criteria for certification of airports under Federal aviation regulation part 139. At the present time, FAA is engaged in a comprehensive review of the standards set out in part 139. In fact, we held a public meeting on July 14, in an effort to get the views of system users on possible ways to revise and improve our standards. The information and ideas received at that meeting are undergoing thorough review and will be taken into consideration as the agency proceeds with its efforts in this area, which may result in a notice of proposed changes to part 139.

Turning to flight operations, FAA's standards in this area are designed to insure the safety of flight. Those dealing with takeoff and landing are especially important, since these are critical phases of flight.

Naturally, airports throughout the country vary in terms of layout, surrounding terrain and buildings, and the like. These factors can limit the feasible approaches to any given airport, and thus are extremely important considerations in establishing operational procedures/instrument approach minimums for an airport.

Establishment of an instrument approach at an airport is based on criteria that consider the visual aids available, terrain and local construction, the type of aircraft that will use the approach, other navigational aids serving the airport, and the effect of air traffic operations at other airports in the vicinity.

Another relevant factor which is taken into account in developing operational procedures around airports is noise. Section 611 of the Federal Aviation Act directs the Administrator to "prescribe and amend such regulations as the FAA may find necessary to provide for the control and abatement of aircraft noise * * *." Mr. Chairman, we take that mandate very seriously. As we forecast the inevitable demand for more and more air transportation, we also see the continuing and increasing constraints imposed on airport capacity due primarily to public and local concerns about noise impact. We know that we must do all that we can to control noise if we are to continue to provide an efficient transportation system.

Consequently, we have undertaken rules and regulations to limit the noise of newly designed, and newly manufactured airplanes. We have imposed a scheduled program of noise compliance for older, noisier airplanes, so that, beginning January 1, 1985, those older airplanes must be modified to provide quieter operation, or be retired from service in the United States.

To complement noise reduction at the source—the airplane itself—we also continue to evolve and tailor operational procedures around airports to minimize the noise impacts there.

But, our first concern, mandated by section 611 of the Federal Aviation Act, must be that any such procedures are "consistent with the highest degree of safety in air commerce or air transportation in the public interest." The FAA does not advocate nor will we approve any noise abatement operational procedures which may place an aircraft outside of its safe operational envelope.

Our constant task is to tailor near-airport operating procedures to minimize noise on airport neighbors, while at the same time maintaining that highest degree of safety which is essential for the traveling public.

Against this brief background of FAA's regulatory responsibilities regarding airport safety, I would like to turn to the topic of FAA's research and development efforts designed to apply new technology to improve airport safety.

One important program we have concerns wind shear. The National Academy of Sciences' study funded by Congress is well underway with a final report due in September. This report will contain recommendations for the communication and display of low-level wind information and warnings to pilots and air traffic control personnel, along with recommendations for improving our ability to conduct safe aircraft operations while taking into account potential hazards due to low level wind shear.

A related effort is the expanded low level wind shear alert system [LLWSAS], test bed in New Orleans. By doubling the number of sensors and increasing processor and display capability, we expect to be able to detect smaller wind shear phenomena than the current network. We expect to receive data from the enhanced system early next year. It must be recognized, however, that enhanced LLWAS will still only detect shear conditions existing in the airport area. Detection of shears in the approach and departure areas must await the implementation of the next generation weather radar program.

The joint aviation weather system [JAWS], program has provided significant data on downburst and microburst wind shear conditions associated with thunderstorms. These data will be analyzed and studied through 1984, and the results of this research effort will be used to improve the forecasting of severe weather phenomena, and in the design of new systems such as NEXRAD.

JAWS data is also being used to provide improved wind shear profiles for use in pilot simulator training. We are also preparing a new pilot training film to incorporate the latest information derived from the JAWS program. In addition, we are examining our wind shear advisory circulars to update them as appropriate. Pilots are currently being trained in the proper techniques for operating in wind shear conditions, particularly on takeoff.

The NEXRAD program is moving ahead on schedule, having just entered the validation phase. This phase is scheduled for completion in 1986, and the first delivery of production systems should occur in fiscal year 1988. Analysis of JAWS data has indicated the NEXRAD type coverage will be required in terminal areas. Coverage of the planned NEXRAD en route grid indicates that some terminal type units will most probably be required. We are currently developing a plan in this area.

Another program you are familiar with is the automated weather observation system. This will allow FAA to provide automated weather observations at airports with precision approach aids.

Additionally, AWOS will replace current manual observations at some sites for improved productivity. The automatic broadcasting of these observations over voice frequencies will yield obvious safety benefits, and in addition, will permit a lowering of approach minima, as well as an overall reduction in the cost of obtaining weather observations.

Another weather-associated problem we have addressed is aircraft icing. As you know, Mr. Chairman, FAA has reaffirmed the clean aircraft concept in its regulations. Simply stated, this prohibits the takeoff of an aircraft when frost, snow, or ice is adhering to the wings, propellers, or control surfaces of the aircraft. These effects, in turn, alter the stability and control of some aircraft and reduce performance. FAA published an advisory circular last December to address issues associated with ground deicing and flight operations following ground operations in icing conditions.

A related problem is the effect that ice, snow, or slush on runway surfaces have on the braking performance and directional control of aircraft. At the present time, there is no adequate method of establishing a correlation between ground vehicle measurements of runway conditions and aircraft performance. Numerous variables associated with the aircraft, runway surfaces and weather conditions all interact to make this a difficult problem.

Hence, over the past decade, FAA has encouraged and supported the application of runway surface treatments to reduce hydroplaning and improve aircraft braking and directional control on wet and slippery runways. Grooving and use of porous friction courses are the two primary surface treatments in use. Additionally, information has been disseminated on the design and maintenance of the runway surface to assure effective aircraft tire traction.

Friction measuring equipment is being studied for use in runway maintenance and airport operations. The condition of runways can be monitored for maintenance purposes by taking periodic measurements on dry runways with friction measuring devices that apply water to the pavement at a controlled rate. The result is an indication of the slipperiness of runways under wet conditions and it is generally accepted that several friction measuring devices are available which can differentiate between good and bad pavement surfaces. Correlation among devices is being determined by extensive testing.

In establishing maintenance criteria, a friction value or benchmark is set that is sufficiently high to achieve good runway friction that is economically reasonable to obtain. When measured friction value is below the recommended benchmark value, correction is made by improving surface texture or removing contaminants.

Operations refers to taking measurements with friction measurement devices during any change in runway conditions. It requires having equipment on the airport mobilized for immediate use when conditions change and refers to taking measurements primarily under snow and ice conditions. Under operational conditions the object is to obtain a friction reference index and then make this information available to the pilots.

The establishment of operational criteria is a far more complex problem than establishing criteria for runway maintenance because of the many variables which are involved in relating friction numbers from measuring devices to aircraft braking performance. A current NASA program is addressing this area.

Another aspect of FAA's runway research concerns the characteristics of the pavement itself. The thrust of this program is to develop improved design, maintenance, evaluation, and construction techniques that could result in stronger, more durable, and less expensive airport pavement.

Close examination of these techniques is important because over 50 percent of the total annual Federal airport grants-in-aid funds have been allocated to airport pavement construction and rehabilitation. Current projections indicate that 53 percent of eligible development costs between 1984–94 will be needed for airport paving. Moreover, the high cost of petroleum based construction materials, compounded by continued growth of traffic and the increase in runway loads resulting from widebody aircraft, necessitates greater emphasis on developing highly advanced criteria for airport pavement development. These are needed to reduce costs of construction, increase airport capacity, reduce runway down time for reconstruction, and meet the high traffic demand forecast for the 1990's.

Cold regions pose unique problems for runways with frost levels and varying pavement load-carrying abilities during the freeze-thaw cycles. We are now gathering data in the behavior of pavement and subgrade during such freeze-thaw cycles.

By next year we expect to finalize a mathematical model to predict the varying characteristics of pavement sections under such conditions. Work is currently being conducted by the U.S. Army Cold Regions Research Engineering Laboratory [CRREL], with a focus on a design guide that can be used for airports in the northern tier of the continental United States and Alaska. For the rapid runway rehabilitation effort, the work will be directed toward restoring pavement serviceability rapidly to reduce runway down time.

Our efforts in the area of crash-fire-rescue have been concentrated on developing fire reduction alternatives in the aircraft safety program. We continue to test and evaluate firefighting agents to maintain standards at the state-of-the-art.

In fiscal year 1985, we plan to review the capabilities of the latest available firefighting equipment. One of the biggest problems in firefighting is getting equipment to accident sites in extremely rough terrain. Existing all-terrain type vehicles may work. However, they could be too slow to be practical. We are continuing to look into this problem.

The FAA, recognizing the rapid growth projected for helicopter operations, recently established a Rotorcraft Project Office to manage the agency's broad activities in this area. This future growth will heavily depend upon the availability of all weather heliports for exploiting the full potential of helicopters. An all-weather capability will enable helicopters to interface with scheduled fixed wing carriers operating out of fully equipped airports, and thereby offer a high level of service dependability comparable to that which is provided by trunk carriers.

In response to an acknowledged need expressed by the industry for all-weather heliport design standards, FAA work has been initiated to develop a comprehensive set of technical data and information which must be considered during the upgrade of the existing heliport design guide. Additional information will be developed to upgrade VFR heliport design standards/guidelines also.

Most of the technology needed to build all-weather heliports exists today. There is a need, however, to identify those methods which are most desirable from a safety and efficiency standpoint. Recognizing the knowledge, experience, and cooperative spirit in the private sector, the FAA Rotorcraft Program Office has established a cooperative program with industry to assist in funding demonstration heliports, through the airport improvement program [AIP] and to provide for the development of design criteria based on experience gained through these demonstration heliports.

Further projects FAA has underway include an economical system for marking and lighting of unpaved runways/airports, heliport IFR lighting and marking system evaluation, and obstruction beacon evaluation.

In fiscal years 1984-85 we plan work on improved distance to go markers, runway exit identification systems, and high speed exit guidance.

FAA and the aviation industry are both concerned about the growing problem of constraints on airport capacity. Several times in the last few years, FAA has called industry experts together to confront the problem and respond with new and innovative solutions.

Last year we supported an effort by top U.S. aviation experts to come together once again to recommend the most practical measures for increasing capacity at the Nation's major airports, and to reduce the growing problems of congestion and delay. Under the Airport Operators Council International [AOCI], an aviation industry task force was convened. The task force produced more than 50 recommendations for action by FAA and by the community itself.

FAA has completed and transmitted to the industry a thorough response to the recommendations. The response reflects the Administrator's view of the importance of the task force recommendations and FAA's commitment to move out to achieve significant improvements.

The Administrator has asked the industry task force to continue working with FAA in three specific areas:

One, validation of the capacity improvement concepts—such as reduction of the runway spacing requirement of independent parallel IFR operations, safe application of IFR converging approaches, more efficient dependent runway operations, the best application of short runways at major airports for corporate and commuter aircraft. Further work is needed to agree on the criteria for success—the conditions under which the community will find such procedures acceptable.

Two, to continue with us to try to achieve the operational possibilities of a workable wake vortex detection and avoidance system.

Three, to continue to highlight airport design issues and critical problems to help focus our programs and assure that there is a clear payoff at the end of any development activity.

The industry task force report, and FAA's response, are not the end of the road. However, we believe that they are important steps toward solving airport capacity problems which could become even more critical in the future if we do not take steps now to address them.

We also believe it is an important example of FAA working closely with industry to try to make needed improvements in our national air transportation system. In this way, we insure that FAA is addressing the needs of the users of the system.

Mr. Chairman, that concludes my prepared statement. At this time, my associates and I would be pleased to respond to your questions.

[The prepared statement of Mr. Blake follows:]

STATEMENT OF NEAL A. BLAKE, DEPUTY ASSOCIATE ADMINISTRATOR FOR ENGINEERING, FEDERAL AVIATION ADMINISTRATION, BEFORE THE HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY, SUBCOMMITTEE ON TRANSPORTATION, AVIATION, AND MATERIALS, CONCERNING THE APPLICATIONS OF NEW TECHNOLOGY TO AIRPORT SAFETY. JULY 18, 1983.

Mr. Chairman and Members of the Subcommittee:

I welcome the opportunity to be here today to discuss FAA's efforts to apply new technology to airport safety. With me are Chip Mudd, Director of the Office of Airport Standards, and Ken Hunt, Director of the Office of Flight Operations.

FAA carries out its duty to ensure airport safety through two main regulatory functions: airport certification, and the establishment of flight operations criteria. Currently, the law empowers the Administrator to issue airport operating certificates and set minimum safety standards for the operation of airports serving air carrier aircraft designed for more than 30 seats. FAA's Airport Standards Office sets the criteria for certification of airports under Federal Aviation Regulation Part 139. The minimum safety standards cover such things as marking and lighting of runways, thresholds, and taxiways; pavement maintenance; crash, rescue, and firefighting equipment; and airport emergency plans. At the present time, FAA is engaged in a comprehensive review of the standards set out in Part 139. In fact, we held a public meeting on July 14, in an effort to get the views of system users on possible ways to revise and improve our standards. The information and ideas received at that meeting are undergoing thorough review and will be taken into consideration as the agency proceeds with its efforts in this area, which may result in a notice of proposed changes to Part 139.

Turning to flight operations, FAA's standards in this area are designed to ensure the safety of flight. Those dealing with take-off and landing are especially important, since these are critical phases of flight. Naturally, airports throughout the country vary in terms of layout, surrounding terrain and buildings, and the like. These factors can limit the feasible approaches to any given airport, and thus are extremely important considerations in establishing operational procedures/instrument approach minimums for an airport. Establishment of an instrument approach at an airport is based on criteria that consider the visual aids available, terrain and local construction, the type of aircraft that will use the approach, other navigational aids serving the airport, and the effect of air traffic operations at other airports in the vicinity. This is a complex process and FAA has laid out definitive guidelines for establishing minimum altitudes for each segment of an approach. Following these guidelines, a technician designs an approach that assures the pilot a safe altitude which will clear the terrain and ground based obstacles under the flight path during the instrument portion of the approach and any subsequent missed approach. Our flight operations standards are designed to take into account all relevant factors at each airport, and they are carefully tailored so that the approaches we prescribe are safe for that particular airport.

Another relevant factor which is taken into account in developing operational procedures around airports is noise. Section 611 of the Federal Aviation Act directs the Administrator to "prescribe and amend such regulations as the FAA may find necessary to provide for the control and abatement of aircraft noise ...". We take that mandate very seriously, Mr. Chairman, as part of our overall mandate to provide for a safe and efficient system of air transportation for this nation. As we forecast the inevitable demand for more and more air transportation, we also see the continuing, and increasing, constraints imposed on airport capacity due primarily to public and local concerns about noise impact. We know that we must do all that we can to control noise if we are to continue to provide an efficient transportation system.

Consequently, we have undertaken rules and regulations to limit the noise of newly designed, and newly manufactured airplanes.

We have imposed a scheduled program of noise compliance for older, noisier airplanes, so that, beginning January 1, 1985, those older airplanes must be modified to provide quieter operation, or be retired from service in the United States. To complement noise reduction at the source - the airplane itself - we also continue to evolve and tailor operational procedures around airports to minimize the noise impacts there. But, our first concern, mandated by Section 611 of the Federal Aviation Act, must be that any such procedures are "consistent with the highest degree of safety in air commerce or air transportation in the public interest". The FAA does not advocate nor will we approve any noise abatement operational procedures which may place an aircraft outside of its safe operational envelope. Thus, noise abatement departure procedures may involve a slight reduction in engine thrust, or a more-rapid clean-up of gear and flaps. During approach, the crew may delay deployment of flaps and gear extension, to minimize thrust requirements, and as a consequence generate less noise. In all cases, there are minimum air speeds, maximum bank angles, and minimum thrust settings which must be observed to provide a safe operational envelope for the aircraft. Our constant task is to tailor near-airport operating procedures to minimize noise on airport neighbors, while at the same time maintaining that highest degree of safety which is essential for the traveling public.

Against this background of FAA's regulatory responsibilities regarding airport safety, I would like to turn to the topic of FAA's research and development efforts designed to apply new technology to improve airport safety. Mr. Chairman, some of our most important programs have been discussed extensively in recent hearings before this Subcommittee. Due to your familiarity with them, I will touch on them only briefly, but in no way is this meant to detract from the significance FAA attaches to these programs.

WIND SHEAR

One important program we have concerns wind shear. The National Academy of Sciences Study funded by Congress is well underway with a final report due in September. This report will contain recommendations for the communication and display of low-level wind information and warnings to pilots and air traffic control personnel, along with recommendations for improving our ability to conduct safe aircraft operations while taking into account potential hazards due to low level wind shear. These recommendations will be considered in defining our further program efforts in this area.

A related effort is the expanded Low Level Wind Shear Alert System (LLWSAS) test bed in New Orleans. By doubling the number of sensors and increasing processor and display capability, we expect to be able to detect smaller wind shear phenomena than the current network. We expect to receive data from the enhanced system early next year. It must be recognized, however, that enhanced LLWAS will still only detect shear conditions existing in the airport area. Detection of shears in the approach and departure areas must await the implementation of the Next Generation Weather Radar (NEXRAD) program.

JAWS

The Joint Aviation Weather System (JAWS) program has provided significant data on downburst and microburst wind shear conditions associated with thunderstorms. These data will be analyzed and studied through 1984, and the results of this research effort will be used to improve the forecasting of severe weather phenomena, and in the design of new systems such as NEXRAD. JAWS data is also being used to provide improved wind shear profiles for use in pilot simulator training. We are also preparing a new pilot training film to incorporate the latest information derived from the JAWS program. In addition, we are examining our wind shear advisory circulars to update them as appropriate. Pilots are currently being trained in the proper techniques for operating in wind shear conditions, particularly on takeoff.

NEXRAD

The NEXRAD program is moving ahead on schedule, having just entered the validation phase. This phase is scheduled for completion in 1986, and the first delivery of production systems should occur in FY 88. Analysis of JAWS data has indicated that NEXRAD type coverage will be required in terminal areas. Coverage of the planned NEXRAD enroute grid indicates that some terminal type units will most probably be required. We are currently developing a plan in this area.

SURFACE WEATHER AUTOMATION

Another program you are familiar with is the Automated Weather Observation System (AWOS). This will allow FAA to provide automated weather observations at airports with precision approach aids. Additionally, AWOS will replace current manual observations at some sites for improved productivity. The automatic broadcasting of these observations over voice frequencies will yield obvious safety benefits, and in addition, will permit a lowering of approach minima, as well as an overall reduction in the cost of obtaining weather observations.

ICING

Another weather-associated problem we have addressed is aircraft icing. As you know, Mr. Chairman, FAA has established the "clean aircraft" concept in its regulations. Simply stated this prohibits the takeoff of an aircraft when frost, snow, or ice is adhering to the wings, propellers or control surfaces of the aircraft. Recent wind tunnel and flight tests indicate that frost, snow or ice on wing surfaces can reduce lift by about 30 percent and increase drag by about 40 percent. These effects can, in turn, alter the stability and control of some aircraft and reduce performance. FAA published an Advisory Circular last December to address issues associated with ground de-icing and flight operations following ground operations in icing conditions.

RUNWAY SURFACE TREATMENTS

A related problem is the effect that ice, snow, or slush on runway surfaces have on the braking performance and directional control of aircraft. At the present time, there is no adequate method of establishing a correlation between ground vehicle measurements of runway conditions and aircraft performance. Numerous variables associated with the aircraft, runway surfaces and weather conditions all interact to make this a difficult phenomenon to assess.

Hence, over the past decade, FAA has encouraged and supported the application of runway surface treatments to reduce hydroplaning and improve aircraft braking and directional control on wet and slippery runways. Grooving and porous friction courses are the two primary surface treatments in use. Additionally, information has been disseminated on the design and maintenance of the runway surface to assure effective aircraft tire traction.

RUNWAY MAINTENANCE

Friction measuring equipment is being studied for use in runway maintenance and airport operations.

"Maintenance" refers to keeping the runway pavement surface above a certain friction level and providing good drainage. It is accomplished by conditioning or improving surface texture through removal of contaminants such as rubber deposits and by improving surface texture by physical means. Drainage can be improved by providing surface drainage channels through grooving or porous friction course.

The condition of runways can be monitored for maintenance purposes by taking periodic measurements on dry runways with friction measuring devices that apply water to the pavement at a controlled rate. The result is an indication of the slipperiness of runways under wet conditions and it is generally accepted that several friction measuring devices are available which can differentiate between good and bad pavement surfaces. Correlation among devices is being determined by extensive testing.

In establishing maintenance criteria a friction value or bench mark is set that is sufficiently high to achieve good runway friction that is economically reasonable to obtain. This will assure safe operations under wet conditions by reducing the potential to hydroplane and will assure that the pavement has an acceptable texture. When the measured friction value is below the recommended bench mark value, correction is made by improving surface texture or removing contaminants.

RUNWAY OPERATIONS

"Operations" refers to taking measurements with friction measurement devices during any change in runway conditions. It requires having equipment on the airport mobilized for immediate use when conditions change and refers to taking measurements under snow and ice conditions. Under operational conditions the object is to obtain a friction reference index and then make this information available to the pilots.

The establishment of operational criteria is a far more complex problem then establishing criteria for runway maintenance because of the many variables which are involved in relating friction numbers from measuring devices to aircraft braking performance. Current efforts are underway which will attempt to answer many questions which remain with respect to correlating friction devices with aircraft braking performance.

FRICTION CORRELATION STUDIES

In response to a recommendation from the Senate Appropriations Committee, the FAA, in cooperation with NASA, is studying the possibility of obtaining a correlation between aircraft braking performance and runway friction measurement devices. Tests are being performed with transport category jet aircraft and four of the more commonly used friction measuring devices under dry, wet and winter snow conditions at several selected operational runways. During the next two winter seasons, data will be collected on several operational airports to determine if a correlation can be obtained among several friction measuring devices on compacted snow and ice covered runway surfaces.

IMPROVED PAVEMENT

Another aspect of FAA's runway research concerns the characteristics of the pavement itself. The thrust of this program is to develop improved design, maintenance, evaluation, and construction techniques that could result in stronger, more durable, and less expensive airport pavement. Close examination of these techniques is important because over 50 percent of the total annual Federal Airport Grants-in-Aid Funds have been allocated to airport pavement construction and rehabilitation. Current projections indicate that 53 percent of eligible development costs between 1984-1994 will be needed for airport paving. Moreover, the high cost of petroleum based construction materials, compounded by continued growth of traffic and the increase in runway loads resulting from widebody aircraft, necessitates greater emphasis on developing highly advanced criteria for airport pavement development. These are needed to reduce costs of construction, increase airport capacity, reduce runway "down" time for reconstruction, and meet the high traffic demand forecast for the 1990's.

PAVEMENT OVERLAY THICKNESS CRITERIA

FAA pavement overlay thickness criteria for rigid pavements is over 10 years old. Shortcomings in the current design criteria are evidenced by pavement deterioration prior to expiration of design life. New criteria for rigid pavements were developed in Fiscal Year 1982. Field testing of the new criteria will be completed in Fiscal Year 1983. Work on developing new criteria for overlays of flexible pavements was initiated in Fiscal Year 1983, and the test results will be applied in the development of new overlay design criteria. These activities show great promise for improving the state of the art of pavement design.

IMPACT OF HEAVY JET OPERATIONS ON PAVEMENT LIFE

Work is continuing on a project to determine the impact that high frequency heavy jet operations have on pavement life. Current design standards are based on extrapolations of much lower traffic counts than many airports currently experience. Premature pavement failures have raised questions as to the reliability of extrapolations. An interim report on the assessment of the required thickness in the FAA Advisory Circular will be issued in Fiscal Year 1985. Field tests to validate procedures to determine whether a newly constructed flexible pavement section meets contract requirements will be completed in Fiscal Year 1984.

PAVEMENT DESIGN FOR COLD REGIONS

Cold regions pose unique problems for runways with frost levels and varying pavement load-carrying abilities during the freeze-thaw cycles. We are now gathering data in the behavior of pavement and sub-grade during such freeze-thaw cycles. By next year we expect to finalize a mathematical model to predict the varying characteristics of pavement sections under such conditions. Work is currently being conducted by the U.S. Army Cold Regions Research Engineering Laboratory (CRREL) with a focus on a design guide that can be used for airports in the northern tier of the continental U.S. and Alaska. For the rapid runway rehabilitation effort, the work will be directed towards restoring pavement serviceability rapidly to reduce runway "down" time.

CRASH-FIRE-RESCUE (CFR)

Our efforts in the area of crash-fire-rescue have been concentrated on developing fire reduction alternatives in the aircraft safety program. We continue to test and evaluate firefighting agents to maintain standards at the state-of-the-art. In Fiscal Year 1985, we plan to review the capabilities of the latest available firefighting equipment. One of the biggest problems in firefighting is getting equipment to accident sites in extremely rough terrain. Existing all-terrain type vehicles may work; however, they could be too slow to be practical. We are continuing to look into this problem.

ALL-WEATHER HELIPORT DESIGN

The FAA, recognizing the rapid growth projected for helicopter operations, recently established a Rotorcraft Project Office to manage the agency's broad activities in this area. This future growth will heavily depend upon the availability of all weather heliports for exploiting the full potential of helicopters. An all-weather capability will enable helicopters to interface with scheduled fixed wing carriers operating out of fully equipped airports, and thereby offer a high level of service dependability comparable to that which is provided by trunk carriers.

In response to an acknowledged need expressed by the industry for all-weather heliport design standards, FAA work has been initiated to develop a comprehensive set of technical data and information which must be considered during the upgrade of the existing heliport design guide. The following types of information will be considered during the design guide upgrade, and may ultimately be contained in the new all-weather design guide:

-Heliport real estate and obstruction requirements based on Aircraft performance.

-ATC, navigation, landing, communications, surveillance, and advanced weather systems.

-Lighting and Marking.

Additional information will be developed to upgrade VFR heliport design standards/guidelines also. The following areas have been identified at this time:

-Dynamic loading on heliport structures

-Effects of terrain and structure-induced turbulence on heliport operations

-Crash, fire, rescue and fuel handling requirements, particularly for roof-top heliports.

Most of the technology needed to build all-weather heliports exists today; there is a need, however, to identify those methods which are most desirable from a safety and efficiency standpoint. Recognizing the knowledge, experience, and cooperative spirit in the private sector, the FAA Rotorcraft Program Office has established a cooperative program with industry to assist in funding demonstration heliports, through the Airport Improvement Program (AIP); and to provide for the development of design criteria based on experience gained through these demonstration heliports.

OTHER PROJECTS

Further projects FAA has underway include an economical system for marking and lighting of unpaved runways/airports; heliport IFR lighting and marking system evaluation; and obstruction beacon evaluation. In FY 1984 and 1985 we plan work on improved distance to go markers; runway exit identification systems; and high speed exit guidance.

AIRPORT CAPACITY IMPROVEMENTS

FAA and the aviation industry are both concerned about the growing problem of constraints on airport capacity. Several times in the last few years, FAA has called industry experts together to confront the problem and to respond with new and innovative solutions. Last year, we supported an effort by top U.S. aviation experts to come together once again to recommend the most practical measures for increasing capacity at the Nation's major airports, and to reduce the growing problems of congestion and delay. Under the Airport Operators Council International (AOCI) an Aviation Industry Task Force was convened to recommend:

- The most promising, cost-effective improvements or changes, from an operational perspective, that FAA should implement at congested airports.

- Specific changes in terminal area rules, procedures and operations, and airport design and operations that would be required to introduce the recommended improvements.

- The conditions under which the changes described above would be accepted by the public and the users of the aviation system.

- Specific recommendations as to candidate airports for the testing, demonstration, operational trials, and other activities judged essential.

The Task Force produced more than fifty recommendations for action by FAA and by the community itself. FAA has completed and transmitted to the industry a thorough response to the recommendations. The response reflects the Administrator's view of the importance of the Task Force recommendations and FAA's commitment to move out to achieve significant improvements.

The Administrator has a management steering group to assure energetic followup of these activities. FAA is implementing recommendations which do not require further development, and is responding to the policy recommendations. Programs which do require further development or analysis are part of our program planning. These include: validation of a number of airport capacity improvement concepts; work on a highly-capable Traffic Management System which will help improve the efficiency of aircraft flow into and out of our airports; further work on the vexing problem of wake vortex detection and avoidance; efforts to make best use of the Microwave Landing System (MLS) to achieve terminal airspace efficiencies and make better use of existing runways; and a series of activities relating to airport design and longer-range airport research.

The FAA Administrator has asked the Industry Task Force to continue working with FAA in three specific areas:

- Validation of the capacity improvement concepts (such as reduction of the runway spacing requirement of independent parallel IFR operations, safe application of IFR converging approaches, more efficient dependent runway operations, the best application of short runways at major airports for corporate and commuter aircraft). Further work is needed to agree on the "criteria for success" - the conditions under which the community will find such procedures acceptable.

- To continue with us to try to achieve the operational possibilities of a workable wake vortex detection and avoidance system.

- To continue to highlight airport design issues and critical problems to help focus our programs and assure that there is a clear payoff at the end of any development activity.

The Industry Task Force report, and FAA's response, are not the end of the road. However, we believe that they are important steps toward solving airport capacity problems which could become even more critical in the future if we do not take steps now to address them. We also believe it is an important example of FAA working closely with industry to try to make needed improvements in our national air transportation system. In this way, we ensure that FAA is addressing the needs of the users of the system.

Mr. Chairman, that concludes my prepared statement. At this time, my associates and I would be pleased to respond to your questions.

Mr. GLICKMAN. Thank you very much, Mr. Blake.

I wonder, first of all, if you would tell us a little bit about what was the FAA's reason to conduct a review of part 139, the whole issue of airport certification.

When did this come about and what do you intend to do with it? Give us some background on this.

Mr. BLAKE. There have been a number of inputs from the user community in specific areas. Our review is looking at the water rescue area, fueling arrangements and crash fire efforts for smaller airports. Snow removal plans, extended safety area requirements and also bird control plans.

Mr. GLICKMAN. I thought you said birth control. Did you say "bird control"?

Mr. BLAKE. Birth control of birds, that is fine.

Mr. GLICKMAN. Will there be standardization of different operations at different airports as part of this?

Mr. BLAKE. Yes; I think there is, and I think that Chip Mudd may have something to add.

Mr. MUDD. The rule as written applies uniformly to all airports. The problem, in administering it across two coasts, is to get uniform application. In doing that we try to have regular meetings with our inspectors to compare what one region is doing with another in order to have uniform application. The intent in the way the rule is written is that it should be uniformly applied and that is our goal.

Mr. GLICKMAN. Well, all of you heard Mr. Jim Burnett talk about preliminary review of their outlook and review of the situation. They say there is a lack of uniformity among regions of the country among airports and the way FAA, in fact, enforces its own rules with respect to part 139 and a variety of airport standards.

How would you respond to that general accusation?

Mr. MUDD. Well, I would say that there may be some substance to it, but it is a problem that we are trying to overcome and if it does exist, I think it is a very localized thing. It is something that we can clear up rather rapidly.

There were references made to, in some instances, enforcement done by persuasion, and in others by sanctions. I think that is true to some degree; where we find that we are getting cooperation. We would rather do it by persuasion. If we are not getting cooperation, we don't hesitate to impose sanctions. So, I don't think it is a difference.

I think the approach depends on what the reaction is to what we are trying to do.

Mr. GLICKMAN. Would there be any reason why the Southwest Region of the FAA would be meting out more enforcement standards than any of the other regions?

Mr. MUDD. No. There should not be.

Mr. GLICKMAN. With respect to the NTSB's recommendations at National Airport, the NTSB was quite strong in indicating its concern about your rejection of their recommendations with respect to the approach to runway 18 in National Airport.

Why were the recommendations of the NTSB rejected?

Mr. BLAKE. Well, FAA reviewed and responded to the recommendations relevant to procedures primarily for runway 18. I think our review has shown that the approach procedures meet all of the criteria established in Terps, which is the document controlling establishment of instrument procedures.

It is our conclusion, I think, from this review that the approaches, when they are properly flown, present no unusual risk at any point during the path, and I think provide more than adequate margins of safety.

I can't stress enough, though, that the terminal procedures were not designed to accommodate a flagrant disregard of published minimum altitudes or rules, but are, in fact, predicated on safe procedures.

Mr. GLICKMAN. Yes, but, Mr. Blake, neither were your rules designed with the possibility that we would build skyscrapers along the flight path. Don't you think that that should have some implication as to the whole issue of landing patterns and approaches at major airports like Washington National?

Mr. BLAKE. Well, we have established standards for the height of buildings, and the approach path to an airport, and those standards have been complied with in the establishment of approaches to runway 18 in all cases.

They are rather short skyscrapers, but they do fall below the plane.

Mr. GLICKMAN. One is almost 400 feet high. That is a pretty good sized building. How long ago were your standards set up in terms of the size of buildings and structures?

Mr. HUNT. I can't answer when these standards were set up. However, the clearance with a minimum altitude over the building that we are talking about is considerably more than the standards.

If you come in on that approach, when you come by that building, you should be approximately 900 feet descending to 720 feet on down the river closer to the runway. So, if you fly the approach the way it is designed to be flown, you are going to be 500 feet above that building.

Mr. GLICKMAN. I guess the issue was in marginal weather conditions when you are looking for the end of the runway with cross winds, sometimes you may be off a little bit.

Mr. HUNT. The lateral displacement of that building is well outside of our requirements. In addition to that, if you maintain your altitude, even if you went right over the top of the building, you would clear it by 500 feet, which is considerably more than you clear a lot of other buildings on a lot of other approaches when you are coming into an airport.

I would agree that it would be great if every approach we had was clear. Being a pilot, I don't like to know that I have got buildings down under me either. But when you look at the approach to 18 at National, the criteria that are set up, and if you follow the published approach procedure it is safe. In fact, prior to the time this Piedmont flight was reported below the building or close to that building, I had asked for people in flight inspection to go out and actually fly each one of the approaches to National Airport from the north.

Mr. GLICKMAN. In bad weather?

Mr. HUNT. Well, I don't know what the weather was at the time they flew it, but we flew the approaches to check it out using the flight inspection equipment to insure that the radios approach radials were in tolerance and there was nothing wrong with the procedures.

Mr. GLICKMAN. I guess my problem is that all these things work fine if everybody is working fine, but sometimes people deviate. Whether it is the pilots or the winds or the ceilings or all sorts of things, and I think we have taken a very marginal airport and we have degraded that airport by putting buildings up there and it concerns me very much.

But let me ask you this question, again. When was the last time you reviewed or updated your structure standards, those structures that are near operating airports in this country?

Mr. HUNT. I would have to furnish that information for you. I don't have that at this time.

Mr. GLICKMAN. The ALPA pilots talked a little bit about the fact that at San Francisco International Airport there were hotels going up, not in the direct pattern, but off to the side where the turns would take place and they said that those structures would not in any way violate your particular policies right now because they were not in the direct pattern.

Is that a correct statement?

Mr. HUNT. Well, when you build a structure around an airport, we really don't have the authority to tell somebody they can't build a structure. What it actually does is that it will increase the landing minimums if it is on an approach or if it is on a takeoff. We have criteria to make turning takeoffs to miss obstructions on the end of the runway.

So, it would fall within our criteria or like John O'Brien said, I think we would require the visibility conditions to be such that you could avoid it.

Mr. GLICKMAN. But, again, going back, the NTSB has specifically recommended, and they made it a high priority that the north/south approach to that runway 18 be modified. They talk about the minimum safe altitude warning systems function did not work very well and the antenna arrary and where it is located.

Do you categorically state that those recommendations will not improve the safety on another north/south landing at the airport and are not needed?

Mr. HUNT. I can't speak to the equipment, but I would say if you fly the approach the way it is designed and published, it is a safe approach. We don't have any problem with it.

Mr. GLICKMAN. That may involve, I guess, my question, the standard of care and of external conditions which may be perfection. I guess my concern is that the worry that because of the realities of the situation there in terms of ceilings and everything else that you might deviate a little bit from and I would urge you to take a review of this issue, again, because I know that the NTSB is going to respond to your letter of last month. I guess it was, in which you responded to them. This is a high concern for people in this part of the country.

Mr. HUNT. Sir, in line with that we do have a program right now where we are monitoring flights into National Airport on runway 18 so that we will be able to determine if we do have a big problem of people leaving the minimum altitude prior to the time that they are supposed to.

So we have a program to monitor the flights that is ongoing at this time.

Mr. Glickman. Let me talk about the generic question. Why are there no enforcement powers under FAR, part 77? I guess this is the Federal air regulation that has to do with obstacles to airports, buildings and this kind of thing. Does anybody know?

Mr. Blake. I might just comment on the basic process under that regulation. Where there is a community proposal to construct a building that would penetrate the safety plane, that proposal must be reviewed by the FAA.

We will comment back to them on what if any the effect of that obstruction or new building would be. It is the community's decision what to do about it.

There are a lot of incentives, of course, for them to want to control the height of the buildings in the vicinity of the airport because you could, through improper construction, limit utility of the airport, and also affect the sponsor's ability to get insurance on his operation.

Cooperation in many cases has been extremely good and construction height has been limited and we have had the help of other agencies such as the FCC in getting some of the structure heights reduced.

Mr. Glickman. But you don't have the legislative requirement then to review structures at all airports that you don't operate then?

Mr. Blake. Only to the extent that they violate the criteria, part 77.

Mr. Glickman. If they do violate the criteria, do you have the power to go into court to prevent the structure from being constructed?

Mr. Blake. No; not currently.

Mr. Glickman. So what is the purpose of the requirement? Can you deny ADAP funds to that airport?

Mr. Blake. Well, I think what one can do—I guess the simple answer is yes, but the building will have some impact perhaps on the minimums available for an approach.

If it looks like a hazard, it will have some impact on the ability to get insurance coverage for the airport.

Mr. Glickman. Could you disallow the approach?

Mr. Hunt. If the building created that kind of a hazard, yes.

Mr. Glickman. Well, you know it strikes me kind of interesting that local communities have gotten very concerned about noise and I know why. I live under an airport pattern, but this is probably a much more serious issue for safe operation. I imagine that pressures by developers and others to develop airport areas is rather great and the average John Q. Public is not quite as sensitized to the fact that there is a 400-foot building on the approach to a runway as they would be on how noisy the 727 is when it takes off over his house.

You know that in my judgment noise abatement procedures work the other way. There is a tendency for them maybe to jeopardize the safety of people who are underneath them so we have a very mixed bag here and I would hope that the FAA, when you are reviewing your part 139 review, that you take a look at this issue, the obstacle issue, because I think it conceivably could become a more serious one that it is now.

Let me ask one last question. Last year Administrator Helms informed us that runway friction testers could be purchased by airports using ADAP grants.

However, we have heard from some airports that have applied for such grants and have been turned down.

Lovell Airport in Chattanooga, Tenn., had their grant canceled when they were told they could purchase a runway tester.

Are runway friction testers eligible under ADAP grants or not, and when can we expect completion of the correlation research now underway?

Mr. MUDD. Yes; they are eligible under that program, and we have been testing ground measuring friction devices. We started last June and just completed this past June to correlation tests between the devices.

Now we have issued a specification standard and once the comments are back and we have had a chance to issue the final standard, then they will be eligible.

The one that you referred to was not canceled. It was just deferred until we had the specification.

Mr. GLICKMAN. So that particular one will be eligible once the specification issue is resolved.

Mr. MUDD. That is correct.

Mr. GLICKMAN. Because there are others. I understand Massachusett, Buffalo, N.Y., Mexico Airport Authority, and others have been denied grants under the program. Maybe it is a deferral of grant rather than a denial?

Mr. MUDD. Right. It is a deferral. The problem we had was to be sure there was competition and we wanted to have correlation so that if you used one, you could equate it to the others.

We now have three devices which can be equated, confirmed by the survey we have done and data we have collected. Once the Re is correlated you can equate one with the other.

Mr. GLICKMAN. What about the correlation research now underway?

Mr. MUDD. I am referring to correlation between the friction measurement devices. The study which you are referring to has to do with equating the friction measurement instruments to aircraft and that is continuing.

Mr. GLICKMAN. Do you have any idea? Where is the state of the research right now? How long a program are we talking about?

Mr. MUDD. Well, we did some limited tests 2 weeks ago in Atlantic City and more are planned, I think, next winter under snow conditions. As I visualize this program, it will be a very long, drawn out affair and I would not want to hazard a guess on its length.

Mr. GLICKMAN. OK. I would conclude by saying I believe this is a high priority in the view of this committee. We had joint hearings with Mr. Gore's subcommittee last year where we talked about this issue, as well.

The whole issue of friction, snow, ice, lack of knowledge to pilots. I just want to reemphasize our concern with it.

Thank you, Mr. Carney.

Mr. CARNEY. Thank you very much.

This question of encroachment comes back again. Getting away from National Airport. Let's go to LaGuardia.

Is anyone here familiar with LaGuardia?

Mr. BLAKE. What specific area?

Mr. CARNEY. Well, I know if you are watching a ball game in Shea Stadium, those guys are coming in—I don't think they are 500 feet above Shea Stadium, are they?

Mr. HUNT. I am not familiar with that approach.

Mr. CARNEY. I am trying to set up some way to compare the situation here with other airports. If you require 500 feet, you will probably close half the airports in the larger cities, I would think, if you could not come within 500 feet of a structure?

Mr. BLAKE. The standard criteria applies to all airports. Every procedure we set up has to meet the Terps criteria and that is a specified clearance plan above all obstruction.

Mr. HUNT. Actually, the building we are talking about in Rosslyn is not the controlling obstruction on that approach. There are other buildings that are further out from the center line of the approach that are controlling obstructions.

Mr. CARNEY. All right. I would suspect that the Washington Monument is an obstruction on 18, as well.

Mr. HUNT. That is the controlling obstruction on the approach there, but it is so far from the center line that it is not involved.

Mr. CARNEY. My concern is I know we have had a relatively high profile at National Airport of late, particularly with the incident at the USA Today Building. We have other airports, Midway, and I know myself from flying into LaGuardia when you come down the Hudson River, if you are a little to the right or a little to the left, your wing could cut the antenna on the Empire State Building on occasions.

I am sure that the clearances there are identical, as Mr. Blake said, the parameters are the same. It is a matter of staying within those parameters.

I go back to watching a baseball game at Shea Stadium. You could hit the plane with a ball.

You really can't, but it is somewhat close. Maybe Willie Mays could, but I asked a couple of the witnesses before about this problem of encroachment. It is going to continue to happen.

We develop and develop and develop. Real estate around airports is prime real estate for various types of operations, particularly hotels.

At the dollars you pay for real estate, it is cheaper to go up than it is to go out, so you are going to be faced with that problem. What is to prevent Dulles from being encroached 40 years from now or 20 years from now and you would have the same problems?

Now, you don't have any control over the zoning or anything? The only thing you can do, I suspect, is to plan airports with enough land around them that whoever owns the airport owns the land around them for safe landings, but that could become rather expensive, as well I would suspect.

Mr. **Hunt**. We have had new airports built all around the country and everybody is aware of it. We have built them 20 miles out in the country, and, before you know it, up to the boundary that is bought by the city or whoever puts the airport in, they have got buildings going up.

Mr. **Carney**. Sure. Then the further out you have to move your airport, the less likelihood there is that people will use it. The convenience factor would be lost.

If you had to go from Kennedy to Dulles going from New York to Washington on a daily basis, you would wind up taking the train. It would be almost as fast because of the proximity of the stations within the city to your destination so you are faced with a problem there.

I would ask one question, getting away from that. They were not questions as much as they were statements to indicate the concern about encroachment, but there is little you can do about it when you don't control zoning and you have to rely on people's common sense.

My question is that if someone were to really want to close that airport, it does not take much to build something much bigger than the news building. Suppose someone built a Sears Tower in that area, would that close the airport or would you have to come in at a greater angle?

Mr. **Hunt**. What we would do is look at it with the criteria we have got, and if there is no way to raise the minimums enough to get around it or design a new approach into there that would fit our criteria, the only solution would be to restrict operations on that end of that runway.

That is the one stick that we have if somebody builds a building off the approach end of an instrument runway or something like that, if it raises the minimums enough to disrupt traffic flow in there, and there is enough interest to keep the traffic flowing, that is our big wedge against the building going up.

If it raises the minimum so high that it is going to cut out a lot of traffic coming into there, that can become an economic problem that the community can't stand. So that is probably our biggest deterrent to big buildings going up that would violate our zones.

Mr. **Carney**. The NTSB complained that the inspector work loads vary very much within the FAA. Would you care to comment on to that statement?

Mr. **Mudd**. Yes, sir. We have 29 inspectors, but they are not full-time inspectors. They do other work.

Our plan of action is to inspect each airport once yearly. We give it a thorough inspection and if there is a problem, we go back. However, the inspector workload may include other duties. Regardless of whatever work these inspectors do, the airport inspection program is covered.

So I don't know specifically what was meant. I would have to see what the precise allegation is before I could answer it. We feel that we do a thorough job and we cover each airport adequately, but the inspectors do do other work.

Mr. **Carney**. Thank you. Mr. Chairman, I have no further questions of the witnesses.

I would just like to thank them all for coming.

Mr. **Glickman**. Thank you very much.

Before you leave, Neal, you heard the ALPA response on on-time weather information. I know you have been actively involved in weather.

I still hear perennially from pilots that they do not have on-time weather information available to them. I wonder if you would respond to that.

Mr. **Blake**. Mr. Chairman, we have a number of active ideas both near term and in the NAS plan to address specifically that problem. We are putting out improved, more frequent forecasts on severe weather information.

We are, as you know, planning to put in a number of automated weather observing stations with direct broadcasts to the pilots and the information there will be a minute or two old at the very most.

We are increasing the speed of our communication circuits that distribute the weather information and a number of other activities and we will be talking to the airline pilots this week on how we can better meet their requirements. There is a good dialog going and I think we have a number of programs that, over the next few years, will significantly improve the real time dissemination of weather.

Mr. **Glickman**. OK. We thank you for being here this morning. We appreciate it very much.

I would like to call our next two witnesses as a panel, if possible. We have Robert S. Michael, director of aviation, representing the Airport Operators Council International, Inc.; and F. Russell Hoyt, executive vice president of the American Association of Airport Executives.

You will both be able to give your statements completely, but It might expedite it if you can come up as a panel and we can ask questions together.

Mr. Michael is in the blue suit and Mr. Hoyt is in the brown suit. Mr. Michael, why don't you proceed first since you were listed first on the agenda.

Both of your statements will appear in the record in their entirety, so you may wish to summarize if you feel it is appropriate.

STATEMENTS OF ROBERT S. MICHAEL, DIRECTOR OF AVIATION, STAPLETON INTERNATIONAL AIRPORT, DENVER, COLO., AND F. RUSSELL HOYT, EXECUTIVE VICE PRESIDENT, AMERICAN ASSOCIATION OF AIRPORT EXECUTIVES

Mr. **Michael**. Thank you very much, Mr. Chairman.

I will indeed summarize our remarks.

My name is Robert Michael, director of aviation for Denver Stapleton International Airport, and the immediate past president of the Airport Operators Council.

On behalf of our U.S. members, we are very grateful for the opportunity to appear before the subcommittee and to commend its commitment to airport safety, a commitment that airport operators enthusiastically endorse as our primary goal.

You may recall, Mr. Chairman, that in the last few years many of the major U.S. airports and air carriers celebrated their 50th anniversary—50 years of progressively better, more efficient and safer methods of carrying passengers, freight and mail.

The industry has established an enviable safety record. Data compiled by the National Transportation Safety Board note 48,040 fatalities in all forms of transportation in 1982. Of this total, 42,990 were highway fatalities, 596 were railroad fatalities, while 323 lives were lost in air transportation, including commuters and air taxi operations.

Although the aviation industry is keenly concerned with reducing fatalities to a minimum, 323 fatalities while enplaning 293,000,000 passengers in 1982 makes air transportation the safest form of common carrier travel.

The NTSB reports that in the 17 years from 1964 to 1981, there were only 22 incidents in which airports have been included as a probable cause, not a regulated factor. We would like to note that there were a total of 885 air carrier accidents over these years and that the 22 involving airports represent only 2.4 percent of the total. The U.S. aviation industry has produced one of the finest and safest air transportation systems in the world.

A little about FAR, part 139, airport certification. Irrespective of this long-term airport safety record, the Congress chose to regulate airport operations, and did so in 1970 through the Airport and Airway Development Act [ADAP], by adding a new provision to the Federal Aviation Act authorizing the FAA Administrator to issue airport operating certificates to airports serving air carriers, and to establish minimum safety standards for the operation of these airports. The FAA implemented this legislation through the issuance of part 139.

The airport operating certificate is issued when the FAA finds, after investigation, that the applicant's airport is properly equipped to conduct a safe operation in accordance with part 139, and when it approves the airport operations manual which is submitted with the application.

The operations manual is a very comprehensive document that describes to the FAA and the public at large how the airport operator intends to operate, maintain, and inspect all systems and operations areas on the airport.

Specifically, the manual contains an airport layout plan, gridmaps for locating specific areas such as maintenance, construction, and air operations areas, airport terrain features, and location of specific NAVAID facilities.

The air operations areas are shown including taxiway and runway systems, vehicle lanes transiting air operation areas, aircraft parking areas, and light systems.

The manual contains an emergency plan for dealing with natural and man-made disasters, and lists all firefighting and rescue equipment to be used to meet airport certification requirements.

The manual describes to the FAA the procedures the airport operator will use to operate, maintain, and inspect all runway systems, taxiway systems and lighting systems on a daily basis, and more than daily in some.

Lighting systems are inspected daily to insure their functioning and to repair or replace bulbs and fixtures. Pavement areas receive daily inspections for material conditions and cleanliness.

The manual provides for snow removal using chemical or mechanical means under the direction of the snow removal committee or other appropriate local authority. It is incumbent upon the airport operator to operate his airport as outlined in the airport operations manual. FAA assures compliance through an inspection system.

There are approximately 680 FAA certificated airports and never has there been occasion in the 11-year history of part 139 for the FAA to revoke a certificate because of an airport having failed in its safety obligations.

There have been a few times when FAA has briefly suspended an operating certificate in situations over which the airport operator has no control such as a strike by crash/fire/rescue personnel.

In short, we equate the introduction of part 139 into the airport system as fine tuning an already well functioning safety system. It may have improved safety, but there is no known basis for quantifying the improvement.

We cannot ignore, though that the effect of part 139 is a significant financial burden on small airports. While large and medium hub airports have been able to cope with the increased costs that accompany airport certification, small and nonhub airports—those enplaning 2,000 airline passengers or less daily—have often found it quite difficult.

This is particularly so in raising funds to operate the smaller airport's crash/fire/rescue [CFR], systems. Airport representatives have voiced their growing concern over this questionable economic burden, and FAA undertook to study the detailed costs and benefits of the FAA-required crash/fire/rescue services provided at smaller airports.

The study concluded that there is such a low level of traffic at the smaller airports that CFR has a rare chance to save any lives or property.

Consequently, the study states the CFR requirements at these smaller airports can be justifiably eliminated. The FAA is preparing to review FAR part 139. We are hopeful the findings of this study will be the basis of relief for smaller airport CFR requirements.

When airports were constructed, they were usually a good distance from the city center. In time, however, as noted earlier, the city grew, extending out to the airport and frequently encircling it.

This often means that airport expansion is constrained because land is not available. It is not uncommon, for example, for airport management to find they cannot lengthen a runway because of the presence of a railroad, an interstate highway, or other essentially immovable obstructions.

Meanwhile, FAA technical and design standards that were acceptable 25 years ago when an airport was constructed may have been altered. FAA's rationale for altering design standards is sometimes unclear but, presumably, stricter standards are to enhance safety.

To illustrate, many airport runways were constructed when the runway safety area extended only 100 feet beyond the runway end. Later, the design standard was changed and the runway safety area was extended to 200 feet.

Even more recently, the criteria were changed again to provide for an additional 800 feet of extended safety area—a total of 1,000 feet. At many airports the additional extensions cannot be provided simply because the land is not available.

Airport operators have no objection to FAA design standards being changed if there is valid reason. We do take exception, however, to the view that the airport becomes marginal or substandard because design criteria have been changed notwithstanding full knowledge that many airports cannot meet that new criteria.

The alternatives can be extreme, such as bridging the runway over the highway; or displacement of runway thresholds which provides footage for the safety area, but shortens the runway an equal amount.

In many instances, such alternatives are not economically or even physically feasible.

Technology and design criteria do change and usually signify improvement based on new knowledge. Stricter standards that enhance safety should by all means be introduced where possible.

The inability, though, to introduce new standards at airports which cannot accommodate the change is not a basis to consider, or worse yet, rate the airport marginal or substandard.

As Mr. O'Brien stated at the beginning, there are not any unsafe airports that they fly into. It is just a case of safe versus more safe airports.

A bit has been said earlier about part 77 and objects affecting navigable airspace.

Airport operators have long been concerned with the height of obstructions that may be constructed near airports. Normally, the land around airports is zoned by the local jurisdiction in accordance with, or even more restrictive than, requirements established in FAA regulations.

Landowners, though, will frequently petition for zoning changes or exceptions in order to erect structures that protrude into the part 77 restricted flight surfaces.

While we can understand the desires of landowners to increase the return on their use of land, as airport operators we must also think in terms of aviation safety.

Part 77, which has a long history, presumably was written to do this. Part 77 requires that notice of certain proposed construction or alterations be provided to the FAA Administrator.

In addition, it establishes standards for determining obstructions, and provides for FAA aeronautical studies of obstructions, local public hearings on hazardous effects of proposed construction, and FAA actions with respect to the establishment of antenna farm areas.

In the past, we feel that the FAA aeronautical studies have, too frequently, erroneously ruled proposed construction to be no hazard to air navigation.

FAA determinations of no obstructions or no hazard to air navigation are often construed at the local level as either endorsement of a proposal or as no objection to a proposed land use.

Such FAA determinations inhibit and often run completely counter to the airport's efforts to control or influence decisions that affect land use planning and the safety of aircraft operations at airports.

AOCI recognizes that the control of land use goes beyond the intent of part 77 and that FAA will not project itself into local land use or zoning conflicts; however, the FAA's approval under part 77 may have an adverse effect upon airport efforts to maintain local airport safety initiatives.

The airport's objections are primarily that FAA is the governmental body concerned with the safety of aircraft. That is good.

However, if the Federal Government says in effect it is not concerned with an issue raised on local airport safety requirements, then proponents at the local level feel that the airport should also have no objection. Hence, the conflict.

With the strong emphasis on compatible land use planning around airports emanating from Federal legislation, AOCI strongly recommends that the FAA address this problem immediately.

As a minimum, FAA Form 7460-1 should be modified to eliminate the phrase "would not exceed any obstruction standard of part 77 and would not be a hazard to air navigation."

In its place, AOCI proposes that the finding be limited to the factual determination that a proposed structure "does not violate the height restrictions of FAR Part 77."

It is time the Federal Government joins with the airport authorities, State and local governments and communities in a cooperative effort to support local zoning regulations and restrictions which are fully compatible with local airport operations.

In short, the technical criteria of part 77 for describing imaginary surfaces and determining obstructions are reasonable. The administration of determination, though, is more than a mere technical issue.

The scope of part 77 also provides for establishing antenna farm areas. AOCI supports the antenna farm concept; however, our principal concern is the apparent lack of authority to require new towers to be located in existing antenna farms, or the reluctance of responsible agencies to establish new antenna farms to accommodate new and taller antennas that will, in no way, create safety hazards at airports.

We suggest that a detailed review be made of the effect this proliferation of antenna development is having on the U.S. navigable airspace, particularly as it applies to terminal control areas.

Further, we recommend that the FAA and FCC authority to establish and require prospective antenna owners to use antenna farms in sensitive airpace areas, be reviewed. If this authority appears to be inadequate, then action should be taken to insure the responsible agencies receive the required power to protect the airspace.

Mr. Chairman, in any discussion of airport safety we believe it important to make a brief statement on aircraft noise, and aircraft noise abatement procedures. Aircraft noise constitutes the primary constraint upon the development of the aviation system.

The extreme difficulty encountered in obtaining public approval for the construction of new airports, for the expansion of existing airports, and for the scheduling of aircraft operations at night is largely the result of community opposition to aircraft noise. Noise annoyance is a national problem affecting the total air transportation system.

Airport operators have no desire to impinge upon the authority of the FAA, the aircraft pilot, or others with authority for the safe operation of aircraft. Airport management is obliged, however, to develop airport noise abatement procedures for the benefit of its airport neighbors that are fully consistent with safety.

Noise abatement procedures vary. In some instances, preferred flight paths are established for arrivals and departures and, in other instances, a specified heading for aircraft takeoffs must be maintained until reaching a given altitude.

Takeoff in a certain direction may be limited to aircraft under a specified gross weight. In all cases, the procedures are designed to keep noisy aircraft away from noise sensitive areas.

Airport operators do not actually promulgate noise abatement procedures; rather, they establish an objective and ask the using carriers to develop procedures to achieve the desired objective.

The FAA may participate in the development process and the FAA will test the procedure if it is deemed appropriate. The FAA will publish and promulgate the procedure once it is agreed upon.

In many instances, if not all, the airport management, FAA, using carriers and community representatives all work together to reach an agreed position.

A little bit about contaminated runways. For over a decade, the FAA, and later NASA, have been investigating the merits of friction measuring vehicles. The results to date have not been conclusive.

There has been similar activity overseas. In 1982, FAA embarked on a program of evaluating various friction measuring devices to develop a data base on contaminated—snow, ice, sleet, freezing, even rubber—runways.

Airport operators have not yet been greatly aided by friction measuring device technology—mu-meter, skiddometer, Saab, and diagonal braking vehicles are examples—to determine whether snow- or ice-covered runways will provide adequate braking action during lands.

Few, if any, airports use just these devices for determining runway conditions during snow or icing conditions.

I mean to emphasize that few of them use those devices only in that determination.

In our view, such friction measurement information only supplements data gathered from other sources, such as the snow removal committee, an experienced operations supervisor, or field maintenance personnel.

These personnel may buttress their conclusions by the use of a small truck or station wagon to further determine the friction qualities of the runway. This is the time honored way of determining the runway condition, and such data does indeed aid in the total determination by reporting the actual physical condition of the runway as often as the condition changes.

Having said this, AOCI supports the friction measurement research program the FAA embarked upon in the 1982–83 winter season, and is actively participating in the program.

We encourage FAA R&D activity that will permit airport management to provide more accurate information to controllers and to pilots. That is our job—condition reporting and maintaining these surfaces in usable condition.

AOCI believes that additional work in the area of airport surface conditions has the potential to improve airport capacity while enhancing flight safety. With confident knowledge as to the state of actual surface conditions, one that relates well to equipment performance, pilots could optimize their landing and takeoff techniques and substantially modify their runway occupancy times, especially during periods of inclement weather.

Additional work on pavement maintenance methods and materials should build on the basis of past programs and definitions of proposed programs, and should be an ongoing effort.

This work should include test and analysis on: One, cost-effective and rapid rubber removal methods and materials; two, snow and ice removal methods and materials with particular emphasis on the proper characteristics of sand mixtures to be used during ice conditions; and three, low-cost surfacing methods to restore proper pavement texture.

Survey, analysis, and proper documentation of currently used methods and materials should be the primary step in this program and the full participation of appropriate industry representatives should be sought.

Mr. Chairman, we have addressed several issues of broad concern. I do have a number of other things that I might touch on, but they are in the record.

I will just list them. We are obviously concerned with things like wake vortex, wind shear, airport surface detection equipment, research and development of pavements, exit taxiway geometry, taxiway marking and lighting, STOL and other advances in aircraft technology, helicopter operations, MLS.

But I can't leave my testimony without saying more about crash/fire/rescue. It is our understanding that the FAA is currently drafting proposed rules that will require airframe manufacturers and carriers to equip air carrier aircraft with new fire prevention techniques and retardant materials as part of a safety program to improve passenger survivability.

Airport operators support such a program.

Earlier in this presentation we briefly addressed the issue of the heavy economic burden borne by the smaller airports in providing the CFR capability as prescribed by FAR, part 139.

Smaller communities need and deserve an adequate air transportation service and provision of this service should not be jeopardized by the establishment of unnecessary CFR requirements by Federal regulations. These small communities deserve relief and this relief should be direct in the sense that costs and requirements are reduced.

FAA has been researching a means to introduce antimisting fuels. Progress has apparently been slow. We believe this program should be funded and pursued more enthusiastically.

Inerted fuels would help prevent aircraft fires, save lives and thus provide small airports relief through reduced CFR needs. We urge the FAA to fully fund necessary R&D to develop new fire prevention techniques and retardant materials.

In summation, Mr. Chairman, continuing FAA research is required in the general areas of airport configuration, pavement strength enhancements, drainage, construction materials, surface treatment, lighting, markings, signage, cost containment, and construction and maintenance techniques.

FAA has an important role in the funding and execution of general airport research and development but, to date, because of a lack of research money or misdirected priority setting, airport research under FAA's aegis has not been given the range of activity or sense of urgency it deserves.

Thank you.

Mr. GLICKMAN. Thank you, Mr. Michael.

[The prepared statement of Mr. Michael follows:]

TESTIMONY
of

AIRPORT OPERATORS COUNCIL INTERNATIONAL

Mr. Chairman and Members of the Subcommittee, I am Robert S. Michael, Director of Aviation, Denver - Stapleton International Airport, and Immediate Past President of the Airport Operators Council International. The Airport Operators Council International is the association of the governmental bodies that own and operate the principal airports served by the scheduled air carriers in the United States, as well as in many countries abroad. Our U.S. Member airports annually enplane more than 90 percent of the domestic and virtually all of the U.S. international scheduled airline passenger and cargo traffic. In addition, our local government members operate many reliever and other general aviation facilities which supplement the large airports in their communities and regions. (A listing of our U.S. Members is attached).

On behalf of our U.S. Members, we are grateful for this opportunity to appear before the Subcommittee and commend its commitment to airport safety, a commitment airport operators also enthusiastically endorse as our primary goal.

You may recall, Mr. Chairman, that in the last few years many of the major U.S. airports and air carriers celebrated their 50th anniversary - 50 years of progressively better, more efficient and safer methods of carrying passengers, freight and mail. The industry has established an enviable safety record. Data compiled by the National Transportation Safety Board (NSTB) note 48,040 fatalities in all forms of transportation in 1982. Of this total, 43,990 were highway fatalities, 596 were railroad fatalities while 323 lives were lost in air transportation including commuters and air taxi operations. Although the aviation industry is keenly concerned with reducing fatalities to a minimum, 323 fatalities while enplaning 293,000,000 passengers in 1982 makes air transportation the safest form of common carrier travel.

The NTSB reports that in the seventeen years from 1964 to 1981 there were only 22 incidents in which airports have been included as a probable cause. We would like to note that there were a total of 885 air carrier accidents over these years and that the 22 involving airports represent only 2.4% of the total. On the average, a fatal aircraft accident occurs at a frequency of 0.003 per million aircraft miles or 0.08 per 100,000 aircraft operations. The U.S. Aviation industry has produced one of the finest and safest air transportation systems in the world.

FAR PART 139 - AIRPORT CERTIFICATION

Irrespective of this long-term airport safety record, the Congress chose to regulate airport operations, and did so in 1970 through the Airport and Airway Development Act (ADAP) by adding a new provision to the Federal Aviation Act authorizing the FAA Administrator to issue airport operating certificates to airports serving air carriers, and to establish minimum safety standards for the operation of these airports. The FAA implemented this legislation through the issuance of FAR Part 139.

The airport operating certificate is issued when the FAA finds, after investigation, that the applicant's airport is properly equipped to conduct a safe operation in accordance with Part 139, and when it approves the airport operations manual which is submitted with the application. The operations manual is a very comprehensive document that describes to the FAA how the airport operator intends to operate, maintain and inspect all systems and operations areas on the airport. Specifically, the manual contains an airport layout plan, gridmaps for locating specific areas such as maintenance, construction and air operations areas, airport terrain features and location of NAVAID facilities. The air operations areas are shown including taxiway and runway systems, vehicle lanes transiting air operation areas, aircraft parking areas, and lighting systems. The manual contains an emergency plan for dealing with natural and man-made disasters, and lists all fire fighting and rescue equipment to be used to meet airport certification requirements. The manual describes to the FAA the procedures the airport operator will use to operate, maintain and inspect all runway systems, taxiway systems and lighting systems on a daily basis. Lighting systems are inspected daily to ensure their functioning and to repair or replace bulbs and fixtures. Pavement areas receive daily inspections for material conditions and cleanliness. The manual provides for snow removal using chemical or mechanical means under the direction of the Snow Removal Committee or other appropriate local authority. It is incumbent upon the airport operator to operate his airport as outlined in the airport operations manual. FAA assures compliance through an inspection system.

There are approximately 680 FAA certificated airports and never has there been occasion in the eleven year history of Part 139 for the FAA to "revoke a certificate" because of an airport having failed in its safety obligations. There have been a few times when FAA has briefly suspended an operating certificate in situations over which the airport operator has no control such as a strike by crash/fire/rescue personnel. In short, we equate the introduction of Part 139 into the airport system as fine tuning an already well functioning safety system. It may have improved safety, but there is no known basis for quantifying the improvement.

FAR PART 139 BURDEN ON SMALL AIRPORTS

We cannot ignore, though, that the effect of Part 139 is a significant financial burden on small airports. While large and medium hub airports have been able to cope with the increased costs that accompany airport certification, small and non hub airports -- those enplaning 2,000 airline passengers or less daily -- have often found it quite difficult. This is particularly so in raising funds to operate the smaller airport's crash/fire/rescue (CFR) systems. Airport representatives have voiced their growing concern over this questionable economic burden, and FAA undertook to study the detailed costs and benefits of the FAA-required crash/fire/rescue services provided at smaller airports. The study concluded that there is such a low level of traffic at the smaller airports that CFR has a rare chance to save any lives or property. Consequently, the study states that CFR requirements at these smaller airports can be justifiably eliminated. The FAA is preparing to review FAR Part 139. We are hopeful the findings of this study will be the basis of relief for smaller airport CFR requirements.

CHANGE IN AIRPORT DESIGN STANDARDS OVER TIME

When airports were constructed, they were usually a good distance from the city center. In time, however, the city grew, extending out to the airport and frequently encircling it. This often means that airport expansion is constrained because land is not available. It is not uncommon, for example, for airport management to find they cannot lengthen a runway because of the presence of a railroad, an interstate highway, or other essentially immovable obstructions.

Meanwhile, FAA technical and design standards that were acceptable 25 years ago when an airport was constructed may have been altered. FAA's rationale for altering design standards is sometimes unclear but, presumably, stricter standards are to enhance safety. To illustrate, many airport runways were constructed when the runway safety area extended only 100 feet beyond the runway end. Later the design standard was changed and the runway safety area was extended to 200 feet. Even more recently, the criteria were changed again to provide for an additional 800 feet of extended safety area -- a total of 1,000 feet. At many airports the additional extensions cannot be provided simply because the land is not available.

Airport operators have no objection to FAA design standards being changed if there is valid reason. We do take exception, however, to the view that the airport becomes "marginal" or substandard because design criteria have been changed notwithstanding full knowledge that many airports cannot meet that new criteria. The alternatives can be extreme, such as bridging the runway over the highway; or displacement of runway thresholds which provides footage for the safety area but shortens the runway an equal amount. In many instances, such alternatives are not economically or even physically feasible. FAA, when changing standards or design criteria, does so with the understanding that airports constructed under earlier criteria continue to meet all safety criteria. The earlier constructed airports are, in effect, "grandfathered."

In AOCI's view, this in no way affects the operation of the airport or the safety of its operation.

Technology and design criteria do change and usually signify improvement based on new knowledge. Stricter standards that enhance safety should by all means be introduced where possible. The inability, though, to introduce new standards at airports which cannot accommodate the change is not a basis to consider, or worse yet rate the airport marginal or substandard. It is actually a case of a "safe" airport and a "more safe" airport.

FAR PART 77 - OBJECTS AFFECTING NAVIGABLE AIRSPACE

Airport operators have long been concerned with the height of obstructions that may be constructed near airports. Normally, the land around airports is zoned by the local jurisdiction in accordance with, or even more restrictive than, requirements established in FAA regulations. Land owners, though, will frequently petition for zoning changes or exceptions in order to erect structures that protrude into the Part 77 restricted flight surfaces. While we can understand the desires of land owners to increase the return on their use of land, as airport operators we must also think in terms of aviation safety. FAR Part 77, which has a long history, presumably was written to do this. Part 77 requires that notice of certain proposed construction or alterations be provided to the FAA Administrator. In addition, it establishes standards for determining "obstructions," and provides for FAA aeronautical studies of obstructions, local public hearings on hazardous effects of proposed construction, and FAA actions with respect to the establishment of antenna farm areas. In the past, we feel that the FAA aeronautical studies have, too frequently, erroneously ruled proposed construction to be "no hazard" to air navigation.

FAA determinations of "no obstructions" or "no hazard" to air navigation are often construed at the local level as either endorsement of a proposal or as no objection to a proposed land use. Such FAA determinations inhibit and often run completely counter to the airport's efforts to control or influence decisions that affect land use planning and the safety of aircraft operations at airports.

AOCI recognizes that the control of land use goes beyond the intent of FAR Part 77 and that FAA will not project itself into local land use or zoning conflicts; however, the FAA's approval under Part 77 may have an adverse effect upon airport efforts to maintain local airport safety initiatives. The airport's objections are primarily that FAA is the governmental body concerned with the safety of aircraft. That is good. However, if the federal government says in effect it is "not concerned" with an issue raised on local airport safety requirements, then proponents at the local level feel that the airport should also have no objection. Hence, the conflict.

With the strong emphasis on compatible land use planning around airports emanating from Federal legislation, AOCI strongly recommends that the FAA address this problem immediately. As a minimum FAA Form 7460-1 should be modified to eliminate the phrase "would not exceed any obstruction standard of Part 77 and would not be a hazard to air navigation." In its place, AOCI proposes that the finding be limited to the factual determination that a proposed structure "does not violate the height restrictions of FAR Part 77."

It is time the Federal Government joins with the airport authorities, state and local governments and communities in a cooperative effort to support local zoning regulations and restrictions which are fully compatible with local airport operations. In short, the technical criteria of Part 77 for describing imaginary surfaces and determining obstructions are reasonable. The administration of determination, though, is more than a mere technical issue.

The scope of Part 77 also provides for establishing antenna farm areas. AOCI supports the antenna farm concept; however, our principal concern is the apparent lack of authority to require new towers to be located in existing antenna farms, or the reluctance of responsible agencies to establish new antenna farms to accommodate new and taller antennas that will, in no way, create safety hazards at airports.

We suggest that a detailed review be made of the effect this proliferation of antenna development is having on the U.S. navigable airspace, particularly as it applies to Terminal Control Areas. Further, we recommend that the FAA and FCC authority to establish and require prospective antenna owners to use antenna farms in sensitive airspace areas, be reviewed. If this authority appears to be inadequate, then action should be taken to insure the responsible agencies receive the required power to protect the airspace.

AIRCRAFT NOISE ABATEMENT PROCEDURES

Mr. Chairman, in any discussion of airport safety we believe it important to make a brief statement on aircraft noise, and aircraft noise abatement procedures. Aircraft noise constitutes the primary constraint upon the development of the aviation system. The extreme difficulty encountered in obtaining public approval for the construction of new airports, for the expansion of existing airports, and for the scheduling of aircraft operations at night is largely the result of community opposition to aircraft noise. Noise annoyance is a national problem affecting the total air transportation system.

Airport operators have no desire to impinge upon the authority of the FAA, the aircraft pilot, or others with authority for the safe operation of aircraft. Airport management is obliged, however, to develop airport noise abatement procedures for the benefit of its airport neighbors that are fully consistent with safety.

Noise abatement procedures vary. In some instances preferred flight paths are established for arrivals and departures and, in other instances, a specified heading for aircraft takeoffs must be maintained until reaching a given altitude. Takeoff in a certain direction may be limited to aircraft under a specified gross weight. In all cases, the procedures are designed to keep noisy aircraft away from noise sensitive areas.

Airport operators do not actually promulgate noise abatement procedures; rather, they establish an objective and ask the using carriers to develop procedures to achieve the desired objective. The FAA may participate in the development process and the FAA will test the procedure if it is deemed appropriate. The FAA will publish and promulgate the procedure once it is agreed upon. In many instances, if not all, the airport management, FAA, using carriers and community representatives all work together to reach an agreed position.

It must be recognized by all concerned that aircraft noise abatement procedures are intended to enhance the operating capabilities of an airport. They are not intended —nor will they be allowed to-- result in unsafe operations.

CONTAMINATED RUNWAYS

For over a decade, the FAA and later NASA have been investigating the merits of friction measuring vehicles. The results to date have not been conclusive. There has been similar activity overseas. In 1982, FAA embarked on a program of evaluating various friction measuring devices to develop a data base on "contaminated (snow, ice, sleet, freezing rain) runways."

Airport operators have not yet been greatly aided by friction measuring device technology (Mu-meter, Skiddometer, Saab and Diagonal Braking Vehicles are examples) to determine whether snow- or ice-covered runways will provide adequate braking action during landings. Few if any airports use just these devices for determining runway conditions during snow or icing conditions. In our view, such friction measurement information only supplements data gathered from other sources, such as the Snow Removal Committee, an experienced operations supervisor or field maintenance personnel. These personnel may buttress their conclusions by the use of a small truck or station wagon to further determine the friction qualities of the runway. This is the time honored way of determining the runway condition, and such data does indeed aid in the total determination by reporting the actual physical condition of the runway as often as the condition changes.

Having said this, AOCI supports the friction measurement research program the FAA embarked upon in the 1982-1983 winter season, and is actively participating in the program. We encourage FAA R&D activity that will permit airport management to provide more accurate information to controllers and to pilots. That is our job — condition reporting and maintaining these surfaces in usable condition.

AOCI believes that additional work in the area of airport surface conditions has the potential to improve airport capacity while enhancing flight safety. With confident knowledge as to the state of actual surface conditions, pilots could optimize their landing and takeoff techniques and substantially modify their runway occupancy times, especially during periods of inclement weather.

Because of this potential significant payoff, additional FAA R&D work should be continuing and broad enough to cover the entire spectrum of: new pavement design and construction to maximize surface friction characteristics; maintenance methods and materials to retain a high level of surface traction; and friction measurement techniques together with improvements in the dissemination of surface condition information to controllers and pilots.

We recommend that FAA undertake the following: a program for predicting aircraft stopping capability under various runway surface conditions; and additional work on new pavement design and construction to maximize surface traction. This should include, for example, detailed test and analysis on such items as porous friction courses, reflex percussive grooving, and other possible cost-effective surface finishes.

PAVEMENT SURFACE CONDITIONS

Additional work on pavement maintenance methods and materials should build on the basis of past programs and definitions of proposed programs, and should be an ongoing effort. This work should include test and analysis on: (a) cost-effective and rapid rubber removal methods and materials, (b) snow and ice removal methods and materials with particular emphasis on the proper characteristics of sand mixtures to be used during ice conditions, and (c) low-cost surfacing methods to restore proper pavement texture. Survey, analysis and proper documentation of currently-used methods and materials should be the primary step in this program and the full participation of appropriate industry representatives should be sought.

Mr. Chairman, our statement to this point has addressed broad issues of concern. I would like now to briefly identify some specific R&D programs that we believe are needed to enhance airport and aviation safety. Not necessarily in order of priority, they include:

WAKE VORTEX

All aircraft create trailing wake vortices, but it has only been since the introduction of wide-bodied jets into the operational fleet that this phenomenon has become operationally significant. These vortices sometimes present a hazard to trailing aircraft. The solution to the wake vortex problem could well be alleviation of trailing vortices at the source. NASA investigated this problem for a number of years, but the program was eventually discontinued. It is our understanding the airframe manufacturers have also looked into removing or reducing vortices at the source, with litte success.

If the FAA had the funds to pursue the wake vortex issue with the same vigor it pursued development of the microwave landing system, a solution might be at hand. We recommend that wake vortex research be adequately funded and that FAA and NASA proceed to develop a program to address the elimination of wake vortex at the source. If wake vortex could be eliminated or sharply curtailed, longitudinal spacings between in-trail aircraft could be reduced and runway capacity correspondingly increased, all with no change to the runway itself. In short, the pay off is immense.

WIND SHEAR

Wind shear in the final approach zone and along the takeoff flight path can be a serious constraint to the safe operation of all aircraft. Since the phenomenon cannot be prevented, it is apparent that further research is necessary to assist ATC personnel and flight crews in readily identifying the condition. To this end, we recommend the valuable information and recommendations developed last year in the National Oceanic and Atmospheric Administration's (NOAA) Joint Atmospheric Windshear Studies (JAWS) project be reviewed and, where feasible, implemented; that low level wind shear alert systems be installed, and necessary R&D be stepped up to ensure the development of an accurate and timely reporting system.

AIRPORT SURFACE DETECTION EQUIPMENT (ASDE)

Many large airports have high volumes of aircraft and vehicles operating on the airport airside, a complex airside geometry, great distances between the control tower and runway and taxiway boundaries, and significant instances of poor weather and congestion. Through employment of Category III ILS and autoland coupling, much of the current air carrier fleet can essentially land in zero-zero weather conditions. However, there is no adequate means of safely moving the aircraft on the ground and getting those aircraft to gate positions in such weather conditions. The FAA should be urged to move as quickly as possible into implementation of the ASDE III program and conduct research on appropriate surface movement guidance and control systems in the following areas: radar based ground traffic detection systems; visual aids for pilots; ground traffic detection systems other than radar, automatic means of guiding and controlling surface traffic; and the human factors involved in acceptance of such systems. We believe the need for such research has been demonstrated.

PAVEMENTS

The Airport Operators Council International has long been concerned with the need for a far-sighted, productive airport pavement research and development program. Large sums are being expended each year for the rehabilitation of pavements that are wearing out long before the end of their design life. It is our view that substantial savings can be effected on the airport airside through an intensified research and development effort that will lead to a rational methodology for the design and evaluation of airport pavements. The objective must be to produce pavements capable of withstanding the increased loads and operational frequency of current and future air carrier aircraft.

To accomplish these general objectives, R&D should be conducted in order to: extend the life of pavements using more durable pavement materials and new design procedures; extend the use of recycled pavement to include aviation pavements; extend the life of flexible pavements using chemical rejuvenators (modifiers); develop more efficient pavement maintenance procedures that would minimize pavement down time; and, develop a pavement management system that uses non-destructive testing (NDT) procedures to predict the remaining service life of existing pavements, and to determine various pavement maintenance strategies as well as establish an inventory of pavement conditions.

EXIT TAXIWAY GEOMETRY

It is considered desirable to develop prototype designs to improve exit taxiway operational characteristics. Too often current design criteria lead to locations and geometries that, once in place, are not used. Specific areas to be studied are: throat width, length and lateral guidance to assist pilots in maintaining safe positioning within exit boundaries and their relationship to exit speed and pilot confidence; minimizing of side loads created by high-speed exiting on aircraft and passengers in conformance with airline policies for passenger comfort and acceptance; and, the impact of varying runway/taxiway separation on exit configuration and location. Prototype geometric designs should be provided for varying runway-taxiway separations.

TAXIWAY MARKING AND LIGHTING

Marking and lighting of exit taxiway and taxiway interesctions, and operating procedures for ground traffic movements which could improve the taxiway exiting capability of aircraft should be reviewed. Specific areas for study are: configuration of lights and markings, i.e., curved nose wheel versus straight intersection centerlines, to accommodate taxiing of larger aircraft; need for lighted hold bars or signage to ensure aircraft do not enter runway when it is occupied; and, possibility of tower-directed lighting system control.

STOL AND OTHER ADVANCES IN AIRCRAFT TECHNOLOGY

Advances in aircraft systems and technology such as demonstrated by STOL aircraft and state-of-the-art braking systems hold promise for reducing Runway Occupancy Time. Adequate funding for research in this area should be provided. Equally as important, analysis of these advances should be continuous so as to implement timely changes and quickly secure the advantages of the improvements.

HELICOPTER OPERATIONS

To the extent that helicopter operations can be made non-interfering with fixed wing aircraft at congested airports, total capacity and safety will be increased. Steps should be taken to facilitate non-interfering helicopter operations at congested airports, and for "city-center" service in short-haul markets.

It is recommended that FAA undertake needed development programs to adequately phase in non-interefering helicopter operations.

MICROWAVE LANDING SYSTEM (MLS)

The inherent characteristics of the Microwave Landing System, coupled with metering and spacing and wake vortex avoidance systems, may permit turns on to final approach much closer to the runway threshhold than is current practice. In addition, MLS may make reduced lateral separation between independent parallel approaches possible and introduction of new noise abatement procedures feasible. Additionally, MLS may have the capability to provide more precise glide paths so that the "following" aircraft would never fly below the path of the lead aircraft, thus avoiding the lead aircraft's vortices. In the interest of increased airport capacity and enhanced safety of operations, AOCI encourages the FAA to develop standards and recommended practices that will bring the MLS to its full potential as early as possible.

CRASH/FIRE/RESCUE

It is our understanding that the FAA is currently drafting proposed rules that will require airframe manufacturers and carriers to equip air carrier aircraft with new fire prevention techniques and retardant materials as part of a safety program to improve passenger survivability. Airport operators support such a program.

Earlier in this presentation we briefly addressed the issue of the heavy economic burden borne by the smaller airports in providing the CFR capability as prescribed by FAR Part 139. Smaller communities need and deserve an adequate air transportation service and provision of this service should not be jeopardized by the establishment of unnecessary CFR requiremets by federal regulations. These small communities deserve relief and this relief should be direct in the sense that costs and requirements are reduced.

FAA has been researching a means to introduce antimisting fuels. Progress has apparently been slow. We believe this program should be funded and pursued more enthusiastically. Inerted fuels would help prevent aircraft fires, save lives and thus provide small airports relief through reduced CFR needs. We urge the FAA to fully fund necessary R&D to develop new fire prevention techniques and retardant materials.

In summation Mr. Chairman, continuing FAA research is required in the general areas of airport configuration, pavement strength enhancements, drainage, construction materials, surface treatment, lighting, markings, signage, cost containment and construction and maintenance techniques. FAA has an important role in the funding and execution of general airport research and development but, to date, because of a lack of research money or misdirected priority setting, airport research under FAA's aegis has not been given the range of activity or sense of urgency it deserves.

Mr. Chairman, that concludes AOCI's statement on airport safety needs.

AIRPORT OPERATORS COUNCIL INTERNATIONAL ROSTER OF MEMBERS

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ALABAMA:
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Alaska - Department of Transportation & Public Facilities
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ARIZONA:
Phoenix - Aviation Department
Tuscon - Airport Authority

CALIFORNIA:
Bakersfield - Kern County Department of Airports
Burbank - Burbank/Glendale/Pasadena Airport Authority
Fresno - City of
Los Angeles - Department of Airports
Oakland - Board of Port Commissioners
Palm Springs - City of
Riverside - City of
Sacramento - County of
San Diego - Unified Port District
San Francisco - City and County of
San Jose - City of
Santa Ana - Orange County Airport
Santa Barbara - Municipal Airport
Stockton - San Joaquin County

COLORADO:
Colorado Springs - City of
Durango-La Plata - County Airport
Denver - City and County of
Pueblo - Memorial Airport

DISTRICT OF COLUMBIA:
Washington - Metropolitan Washington Airports

FLORIDA:
Daytona Beach - Regional Airport
Fort Lauderdale - Board of Broward County Commissioners
Fort Myers - Lee County Airport
Jacksonville - Port Authority
Melbourne - Airport Authority
Miami - Dade County Aviation Department
Naples - Municipal Airport
Orlando - Greater Orlando Aviation Authority
Palm Beach - Board of County Commissioners
Pensacola - City of
St. Petersburg-Clearwater - International Airport
Sarasota-Manatee - Airport Authority
Tampa - Hillsborough County Aviation Authority

GEORGIA:
Albany - Albany-Dougherty County Airport
Atlanta - Department of Aviation
Savannah - Airport Commission

GUAM:	Guam - Government of
HAWAII:	Honolulu - Department of Transportation
ILLINOIS:	Chicago - Department of Aviation Moline - Rock Island County Metropolitan Airport Authority Peoria - Greater Peoria Airport Authority Rockford - Greater Rockford Airport Authority Springfield - Airport Authority
INDIANA:	Fort Wayne - Board of Aviation Commissioners Indianapolis - Airport Authority South Bend - St. Joseph County Airport Authority
IOWA:	Cedar Rapids Des Moines - Department of Aviation Mason City - Municipal Airport Commission
KANSAS:	Topeka - Metropolitan Airport Authority Wichita - Airport Authority
KENTUCKY:	Lexington - Lexington-Fayette Urban County Airport Board Louisville - Regional Airport Authority of Louisville and Jefferson County Paducah - Airport Corporation
LOUISIANA:	Baton Rouge - Greater Baton Rouge Airport District Lafayette - Airport Commission New Orleans - Aviation Board Shreveport - Airport Authority
MAINE:	Bangor - City of
MARIANA ISLANDS:	Saipan - Bureau of Transportation Saipan - Mariana Islands Airport Authority
MARYLAND:	Maryland - State Aviation Administration
MASSACHUSETTS:	Boston - Massachusetts Port Authority
MICHIGAN:	Detroit - Board of Wayne County Road Commissioners Flint - City of Freeland - Tri-City Airport Commission Grand Rapids - Kent County Aeronautics Board Jackson - County Airport-Reynolds Field Kalamazoo - Municipal Airport Lansing - Capital Region Airport Authority Muskegon - County Airport
MINNESOTA:	Minneapolis-St. Paul - Metropolitan Airports Commission
MISSISSIPPI:	Gulfport - Gulfport-Biloxi Regional Airport Authority Jackson - Municipal Airport Authority Laurel/Hattiesburg - Pine Belt Regional Airport Authority

MISSOURI:	Columbia - City of
	Kansas City - Aviation Department
	St. Louis - Airport Authority
	St. Louis County - Spirit of St. Louis Airport
	Springfield - Municipal Airport Board
MONTANA:	Great Falls - International Airport
	Missoula - County Airport
NEBRASKA:	Lincoln - Airport Authority
	Norfolk - Karl Stephaan Memorial Airport
	North Platte - Airport Authority
	Omaha - Airport Authority
NEVADA:	Las Vegas - Clark County Department of Aviation
	Reno - Airport Authority of Washoe County
NEW HAMPSHIRE:	Manchester - Airport Authority
NEW JERSEY:	Trenton - Mercer County Airport
	Atlantic City - Airport Utility
NEW MEXICO:	Albuquerque - City of
NEW YORK:	Binghamton - Broome County Airport
	Buffalo - Niagara Frontier Transportation Authority
	New York - Metropolitan Airports Authority
	New York - Port Authority of New York and New Jersey
	Syracuse - Department of Aviation
	White Plains - Westchester County Airport
NORTH CAROLINA:	Asheville - Regional Airport Authority
	Charlotte - City of
	Greensboro-High Point - Airport Authority
	Raleigh - Raleigh-Durham Airport Authority
	Winston-Salem - Airport Commisssion of Forsyth County
OHIO:	Akron-Canton - Regional Airport
	Cincinnati - Kenton County Airport Board
	Cleveland - City of
	Columbus - Port Columbus International Airport
	Dayton - Department of Aviation
	Toledo-Lucas County - Port Authority
	Youngstown - City of
OKLAHOMA:	Oklahoma City - Airport Trust
	Tulsa - Airport Authority
OREGON:	Portland - Port of
PENNSYLVANIA:	Lehigh-Northampton - Airport Authority
	Middletown - Pennsylvania/DOT Bureau of Aviation
	Philadelphia - Department of Commerce
	Pittsburgh - Greater Pittsburgh International Airport
PUERTO RICO:	San Juan - Puerto Rico Ports Authority
RHODE ISLAND:	State of Rhode Island - Division of Airports

SOUTH CAROLINA:
Charleston - County Aviation Authority
Columbia - Metropolitan Airport
Greenville-Spartanburg - Airport Commission

TENNESSEE:
Chattanooga - Municipal Airport
Knoxville - Metropolitan Airport Authority
Memphis-Shelby County - Airport Authority
Nashville - Metropolitan Airport Authority

TEXAS:
Austin - City of
Brownsville - City of
Dallas - Department of Aviation
Dallas/Fort Worth - Regional Airport Board
El Paso - City of
Harlingen - Vallley International Airport
Houston - City of
San Antonio - Department of Aviation

UTAH:
Salt Lake City - Airport Authority

VERMONT:
Burlington - Airport Commission

VIRGINIA:
Newport News - Peninsula Airport Commission
Norfolk - Port and Industrial Authority
Richmond - Capital Region Airport Commission

VIRGIN ISLANDS:
St. Thomas - Virgin Islands Port Authority

WASHINGTON:
Seattle - Port of
Seattle - King County Airport (Boeing Field)
Spokane - Airport Board

WISCONSIN:
Janesville - Rock County Airport
La Crosse - Municipal Airport
Madison - Dane County Regional Airport
Milwaukee County - Department of Public Works
Oshkosh - Wittman Field Airport

WYOMING:
Casper - Natrona County International Airport
Cheyenne - Airport Authority
Rock Springs - Sweetwater County Airport Authority

Mr. GLICKMAN. Mr. Hoyt, your entire statement will appear in the record.

Mr. HOYT. Thank you.

What I will do is summarize mine, either to cover points not covered by others or merely for emphasis of those points that have been covered.

For the record, I am Russell Hoyt, executive vice president of the American Association of Airport Executives. With me is Paul Bollinger, who is the assistant director.

The committee's particular areas of concern are bad weather operations, noise abatement, and runway conditions and condition reporting. We will try to respond in each of these areas.

Bad weather operations can be subdivided into those that impact on the aircraft once it is airborne and those that affect the aircraft while it is still on the ground.

Under the first category would be wind shear, restricted ceiling, visibility, and although not a bad weather element, wake turbulence. As we are not particularly qualified to comment on these factors, we won't.

However, cleaning the runways and reporting runway conditions are the direct responsibility of airport management. I will have more to say on that later.

We are involved in the noise abatement matters not by choice but of necessity. Before the advent of what many people consider the noisy jet aircraft, the airport was considered a good neighbor. Those days are gone. The airport now is a sort of persona non grata in many communities.

We should point out that no manager willingly imposes curfews, operational procedures, or airport restrictions; rather, is forced to do so by community pressures. I think for the record, it is extremely important that the impact of aircraft noise be fully understood.

No other single element has so impeded the expansion and improvement of airports. Because sufficient numbers of people consider the noise unacceptable, it is often next to impossible, if not impossible, to site new airports or proceed with needed improvement of existing airports.

Now, as to runway conditioning and condition reporting, these are the direct responsibility of airport management. It is our job to clean the runways and other operational areas to the best condition that man and machines will permit. However, as this is not always possible, then to inspect and report as accurately as possible what the runway conditions are.

Unfortunately, snow removal and ice control is a very inexact science. There are many variables in the winter operations equation: Snow type—wet or dry—temperature, dewpoint, wind, duration of precipitation, storm direction, and time of day. They combine to make snow removal or ice control more of a seat-of-the-pants operation and application of practical experience rather than a scientific exercise.

We believe that airports do a credible job in keeping airports operational but we need help in this area. Perhaps we are about at the limit in terms of utilizing machines that either blade, brush, or blow snow. Research needs to be brought to bear on the problem. Perhaps local weather modification, laser beams, nuclear power, or other exotic procedures must be examined, otherwise we will continue to see air transportation occasionally come to a halt because of the inability of a number of key airports to stay operational.

The World and Air Florida accidents put great emphasis on runway conditions and assessment and reporting of such conditions. As we stated before, these are the direct responsibilities of airport management. But beyond the cleaning, assessing, and reporting of runways, there is a serious question of the aircraft's ability to safely land and stop given the existing runway conditions.

It is here, I think, that we should point out that we should not be expected to judge whether an aircraft of a certain type with a given gross landing weight at a known speed can safely decelerate and stop on a runway of a given length with a certain wind direction and velocity. We are not qualified to make that decision.

We have been criticized by the NTSB and others for either not providing pilots with accurate information on runway coefficient of friction or not closing the airport when snow and ice conditions are prevalent.

As to measurement of runway friction, it is in the position of airport management dating back many years that if a relatively simple reliable machine or procedure is available to provide readings which are significant to the pilot, then we will immediately adopt that method or use that machine.

We, as are many other groups, are greatly concerned with friction measurement and are participating in a number of tests being conducted at Wallops Island and last winter at Dulles. The Port Authority of New York and New Jersey, the Greater Buffalo Airport, and Detroit Wayne County Airport will be conducting a series of tests under actual weather conditions. The smaller airports, many of whom cannot nor should not be required to use extensive complicated machines, will be compiling data on the Tapley meter.

AAAE is forming a committee to exchange information in an effort to determine if there is a repeatability to readings. The reading will not be for the purpose of advising the pilot whether he can safely land. The readings will be given, if they prove to be reliable, to the pilot so that he will be in a much better position to make a decision as to the use of that runway.

We take the matter of runway clearing and reporting very seriously. We are not trying to minimize the situation. However, the answer does not lie in more regulation as some have advocated. No amount of regulation is going to motivate airport management to improve snow removal or ice control operations.

One easy fix recommended by some is to close the airport when runway conditions deteriorate or even on the receipt of an isolated report of breaking action nil. Runways or airports are occasionally closed temporarily to permit snow removal equipment to operate freely or when snow and freezing rain make it impossible for any type of aircraft to operate safely.

However, if we are pushed by the NTSB or the FAA to close, we will come down on the safe side, legally, that is, and close at the least provocation. The consequences of a regulation or strong recommendation that would result in the closing of airports due to lack of an essentially clean runway would be substantial.

The Federal Aviation Act was amended in 1970 to require the certification of any airport serving the certificated aircarriers. More recently, Congress extended the certification requirement of the so-called commuter airports, especially any which accommodates an aircraft having more than 30 passenger seats.

The certification program has gone essentially pretty well. With the exception of the CFR requirement, airport management considers compliance with the certification requirements something that a prudent airport manager would do even without FAR, part 139.

Airport management believes and practices the policy that it is its responsibility to operate a safe airport and it is the FAA's role to check and see that this is done. What airport management needs is not more regulation but more assistance in the how-to category. R&D efforts could well be directed to such areas as friction measurement and correlation to aircraft braking, snow removal, and ice control.

We are still faced with the archaic procedure of physically moving the snow from one place to another. Even a method to more accurately measure the depth of snow or slush would be helpful.

BIRD HAZARD CONTROL

Unfortunately, there is no good fix on how to reduce or eliminate birds around airports. It would almost seem that we would need to look to bird-proofing the airplane for a fix that would be permanent.

Increasing airport capacity: I mentioned why it was difficult to do that because of some people's objection to noise.

FUEL FLAMMABILITY REDUCTION

This is by far the most important item as far as we are concerned. We must step up our present rather feable efforts to perfect an antimisting treatment of aircraft fuel. Few things would improve the survivability in aircraft accidents more.

We have apparently been lulled into a false sense of security by stationing fire trucks at all aircarrier airports. I say "false sense of security" because we save very, very few lives. Experience has shown that if the fire following an accident is of sufficient intensity to preclude or impede self-evacuation, then CFR won't do the occupants much good.

Only by decreasing intensity of the fire by antimisting or other techniques will the survivability improve.

The Airline Deregulation Act, specifically 419, charges the Administrator with a responsibility of imposing requirements on the commuter airports.

In carrying out this mandate of Congress, there seems to be sort of a double standard applied. The facilities that are provided by the airport operator, for example, overrun areas, lighting, CFR, clear approaches and so on, are required and closely checked.

However, there is much more to a safe airport than the on-airport facilities. Control towers, ALS, ILS, MLS, approach radar and similar navaids all contribute immeasurably to a safe approach and departure from an airport. Yet, strict cost-benefit analyses are applied to those items which the Federal Government provides.

We have no quarrel with such analysis, but certainly believe that the same standard should be applied to those items that the airport operator is required to provide.

That completes my testimony. If there are questions, I will try to respond.

[The prepared statement of Mr. Hoyt follows:]

American Association of Airport Executives
2301 M STREET, N.W. ■ WASHINGTON, D.C. 20037 ■ (202) 331-8994

STATEMENT OF THE
AMERICAN ASSOCIATION OF AIRPORT EXECUTIVES
BEFORE THE
HOUSE SUBCOMMITTEE ON TRANSPORTATION,
AVIATION AND MATERIALS

JULY 18, 1983

Mr. Chairman and Members of the Subcommittee:

We appreciate this opportunity to speak on the important matter of airport safety. I am Russell Hoyt, Executive Vice President of the American Association of Airport Executives. The members of this association are the individuals directly responsible for the management and operation of the nation's airports. They are the managers of the large, medium and small air carrier airports, the commuter airports, the relievers, and the general aviation airports. Because of this membership at virtually any airport of consequence in the United States, we believe we are well qualified to comment on the airport safety issues.

The subcommittee's particular areas of concern are the problems of bad weather operations, noise abatement operational criteria, and runway conditioning and condition reporting. We will try to respond in each of these areas.

Bad Weather Operations

Such operations can be subdivided into those that impact on the aircraft once it is air borne and those that affect the aircraft while it is still on the airport. The first category would include wind sheer, restricted ceilings and visibility, and although not a bad weather element, wake turbulence. We are not qualified to comment on these factors--there is a lot that we don't know about them and unfortunately a lot that the experts--meteorologists, airmen, and scientists--don't know about them. Much research must be conducted particularly on the wind sheer problem because it can have such a severe adverse effect on the aircraft's ability to fly. Wake turbulence although an in-flight problem, has a very definite bearing on the efficiency of the airport. Because so little is known about this phenomenon, pilots and controllers must build in a large margin for safety in terms of aircraft separation. Such separation often adversely affects an airport's capacity which is of growing concern at many of our major airports.

The third facet of bad weather operations is the weather elements that affect the runway and hence the operation of the aircraft in landing and takeoff. Cleaning runways and reporting runway conditions are the direct responsibilities of airport management. I will have more to say on this later.

Noise Abatement Operational Criteria

Airport management has become deeply involved in noise abatement matters not by choice but of necessity. Before the advent of what many people consider the noisey jet aircraft, the airport was considered a good neighbor. These days are gone; the airport now is a sort of persona non grata in many communities. The airport operator is in many cases having to do a balancing act between the community on one hand and the aircraft operators on the other. The airport is caught right in the middle. The "noisey" airplane is long gone but the airport manager is left to handle the noise complaints. For years almost everybody including the airlines and the FAA walked away from the problem except of course the airport manager.

No manager willing imposes curfews, operational procedures, or other airport restrictions; rather he is forced to do so by community pressure. The Federal government has preempted the control of the airplane while in flight yet the courts have held that the airport is liable for the noise. Truly a no win situation. However from a safety standpoint, I think you will find that no airport has established mandatory procedures which were deemcd unsafe by either the FAA or the airline operator. It is true that the professional pilots occasionally complain about unsafe maneuvers necessitated by an airport's noise abatement procedures. In such cases the appeals should be directed to the FAA and the air carrier operator. They must be the judge, not the airport manager, as to what is a safe or unsafe procedure.

Part 36 was adopted some years ago; the compliance to date has been reasonably good and the FAA has given no indication that it will waffle in requiring full compliance by 1985. We would urge this committee to make strong recommendations that there be no relaxing of the requirements in the form of waivers or extensions for compliance. We believe it is extremely important that the impact of aircraft noise be fully understood. No other single element has so impeded the expansion and improvement of airports. Because sufficient numbers of people consider the noise unacceptable, it is often next to impossible, if not impossible, to site new airports or proceed with the needed improvement of existing airports. And this in turn has an adverse effect on the safety and efficiency of the airport system.

Runway Conditioning and Condition Reporting

These are the direct responsibility of airport management. It is our job to clean the runways and other operational areas to the best condition that man and machines will permit; however as this is not always possible, then to inspect and report as accurately as possible what the runway conditions are. Unfortunately snow removal and ice control is a very inexact science. There are many variables in the winter operations equation, such as: snow type (wet or dry), temperature, dewpoint, wind, duration of precipitation, storm direction, and time of day. They combine to make snow removal or ice control more of a "seat of the pants", local intuition, and application of practical experience than a scientific exercise.

We believe that airports do a creditable job in keeping airports operational in all but the severest storms. It is not unusual to have an airport keep open during a storm but to have its efforts thwarted because no one can get to or from the airport due impasssable highways.

We need help in this area. Perhaps we are about at the limit in terms of utilizing machines that either blade, brush or blow snow. Research needs be brought to bear on the problem. When the railroads found that they could not keep the tracks clear through the use of conventional plows and blowers, they built snow sheds to keep the snow off the tracks. Obviously snow sheds are not the answer for airports but perhaps local weather modification, laser beams, nuclear power or other exotic procedures must be examined--otherwise we will continue to see air transportation occasionally come to a halt because of the inability of a number of key airports to stay operational.

The World and Air Florida accidents put great emphasis on runway conditions and the assessment and reporting of such conditions. As was stated before, these are the direct responsibility of airport management and that we need research assistance in these areas. But beyond the cleaning, assessing and reporting of runways, there is the serious question of the aircraft's ability to safely land and stop given the existing runway conditions. It is here that we should make it clear that we should not be expected to judge whether an aircraft of a certain type with a given gross weight landing at a known speed can safely decelerate and stop on a runway of a given length with a certain wind direction and velocity.

We have been criticized by the NTSB and others for either not providing the pilots with accurate information on runway coefficient of friction, or not closing the airport when snow and ice conditions are prevalent. As to the measurement of runway friction, it has been the position of airport management dating back many years that if a relatively simple reliable machine or method is available to provide readings which are significant to the pilot, then we will immediately adopt that method or use that machine.

There has been a controversy brewing for years as to whether the MU Meter, the Skidometer, the Diagonal Braking machine is the best. A number of MU meters were purchased and used at some of the larger airports. We have no accurate figures but understand that due to problems in calibration and primarily because the readings had little or no significance to the pilots, many of the meters are not being use. We, as are many other groups, are greatly concerned with friction measurement and are participating in a number of tests being conducted at Wallops Island and last winter at Dulles. More recently airport operators, chief among them the Port Authority of NY and NJ, the Greater Buffalo Airport, and the Detroit Wayne County Airport will be conducting a series of tests under actual weather conditions this coming winter--that is, if Nature cooperates by providing snow--last winter for the most part, it did not. With regard to the smaller airports many of whom cannot, nor should be required to, use expensive complicated machines, will be compiling date on the Tapley meter. AAAE is establishing an adhoc committee of managers who have and are using the Tapley. The committee will exchange information in an effort to determine if there is a repeatability to the readings. The readings will not be for the purpose of advising a pilot whether he can safely land; however if the readings prove to be reliable and given to a pilot, he will be in a much better position to make a decision on the use of the runway.

We take this matter of runway clearing or reporting very seriously. We do not minimize the situation. However the answer does not lie in more regulation as some have advocated. No amount of regulation is going to motivate airport management to improve snow removal or ice control operations. One easy fix recommended by some is to close the airport when runway conditions deteriorate or even on receipt of an isolated report of braking action nil. Runways or airports are occasionally closed either for temporary periods to permit snow removal equipment to operate freely or for extended periods when continued snow or freezing rains make it impossible for any type or aircraft to operate safely. However if we are pushed by the NTSB or the FAA to close, we will come down on the safe side, legally that is, and close at the least provocation. The consequences of a regulation or strong recommendation that would result in the closing of airports due lack of an essentially clean runway would be substantial:

--If several airports in the same geographic region were closed at the same time, then air carriers might find both their intended destinations and their alternates unavailable while in flight.

--Certain aircraft, including most of the general aviation fleet and some air carrier aircraft can operate safely when the heavier, high landing speed aircraft can not.

Public airports are in the U.S. owned and operated by local or state governments. In most other countries the public airports are federally operated. Congress has charged the FAA with serious responsibilities for aviation safety including safety at airports. The Federal Aviation Act was amended in 1970 to require the certification of any airport serving the certificated air carriers. More recently Congress extended the certification requirement to the so called commuter airports, specifically any airport which accommodates an aircraft having more than thirty passenger seats. The certification process has generally gone well. With the exception of the CFR requirement, airport management considers compliance with the certification requirements something that a prudent airport manager would do even without FAR Part 139. Whatever friction may have developed in implementing Part 139 resulted from the assumption that it is the FAA that is responsible for the operation of a safe airport. Airport management believes and practices the policy that it is its responsibility to operate a safe airport and it is the FAA's role to check to see that this is done. What airport management needs is not more regulation but more assistance in the "how to" category. R & D efforts could well be directed to such areas as:

Friction measurement and correlation to aircraft braking.

Snow removal and ice control. We are still faced with the archaic procedure of physically moving the snow from one place to another. Even a method to more accurately measure the depth of snow or sluch would be helpful.

Bird hazard control. There is no good fix on how to reduce or eliminate birds around airports. The birds were here long before the airplane and will probably be here long afterwards. It would appear that we should look to bird-proofing the airplane.

Increasing airport capacity. Few new airports will be built; therefore we will have to get better utilization from existing airports. Airport capacity has a bearing on airport safety.

Fuel flammability reduction. This is by far the most important item. We must step-up our present rather feeble efforts to perfect an antimisting treatment of aircraft fuels. Few things would improve the survivability rate in aircraft accidents. We have apparently been lulled into a false sense of security by stationing shiney red or yellow fire trucks at all air carrier airports. I say false sense of security because we save very very few lives. Experience has shown that if the fire following an accident is of sufficient intensity to preclude or impede self evacuation by the occupants, then CFR won't do the occupants much good. Only by reducing the intensity of post accident fires through antimisting or other techniques will the survivability rate improve.

The Airline Deregulation Act, specifically Section 419c, charges the Administrator with the responsibility of imposing requirements "to assure that the level of safety to persons traveling by air on such commuter air carriers is, to the maximum feasible extent, equivalent to the level of safety provided to persons traveling on (certificated) air carriers". In carrying out this mandate of Congress there seems to be sort of a double standard applied. The facilities that are provided by the airport operator, for example, over run area, lighting, CFR, clear approaches, and so on are required and closely checked. However there is much more to a safe airport than the on-airport facilities. Control towers, ALS, ILS, approach radar, and similar navaids all contribute immeasurably to the safe approach and departure from an airport. Yet strict cost/benefit analyses are applied to those items which the federal government provides. We have no quarrel with such analyses but certainly believe that the same standard should be applied to those items that the airport operator is required to provide.

We appreciate this opportunity to express our views on this important subject. I will be happy to try and respond if there are questions.

Mr. GLICKMAN. I thank you both for excellent testimony. A couple of brief questions.

Mr. Michael, on page 5 of your statement, with respect to FAR part 77, about objects affecting navigable airspace, you state, "In the past, we feel that the FAA aeronautical studies have too frequently erroneously ruled proposed construction to be 'no hazard to air navigation.' "

Do you have any specific examples in mind that might be useful for this committee?

Mr. MICHAEL. There have been two or three and perhaps many more situations around the country where the determination of no hazard has either been reversed or found to be in error by a court or jurisdiction. In one case in Wisconsin, a court found that the FAA abrogated its responsibilty by using an improper judgment with respect to some wires supporting a radio tower.

Another case that I am more closely familiar with happened at a general aviation airport immediately adjacent to a Arapahoe County Airport that was only quasi-legal. By using part 77 and the application of its criteria, the FAA judged that some public utility company high-tension lines that were going to go in south of the airport did not violate the criteria and, therefore, "were of no hazard," quote, unquote.

Denver and Arapahoe County are at nearly 6,000 feet elevation and the takeoff performance of many aircraft, including many of the general aviation fleet, are such that that powerline would definitely have imposed a hazard irrespective of the fact that it did not punch through part 77 criteria.

The pilots and the airport took the matter to the public utilities commission. The public utilities commission had the commonsense to recognize that there was some validity in what the pilots and the airport were saying, and required the utility company to bury the lines.

Now, had they not required that, I am confident that over time, somewhere along the line, an aircraft trying to climb out on a southern departure would have, in fact, contacted one of those powerlines even though part 77 said it was not a hazard.

It was a hazard.

Mr. GLICKMAN. That is a very interesting statement.

Let me ask you both the question of going to runway conditions.

Mr. Hoyt, you talk about taking this matter of runway clearing and reporting seriously. We do not minimize the situation.

However, the answer does not lie in more regulation, as some have advocated.

In testimony today as well as in talking with many pilots, they tell me that airports in this country operate under different standards, even when you consider different climactic conditions and geographical and topographical conditions. Some airports, say, do a better job of clearing runways than other airports. Some airports will keep runways open and conditions when other airports would not keep runways open.

I guess my question is that, shouldn't there be a requirement for more standardization in the area of runway clearing as well as in the area of runway conditions, friction and related things?

Mr. Hoyt. As I said, Mr. Chairman, we take this very seriously. As an example of that, each year there is a group of 200 or 300 airport managers and the people responsible under them for clearing snow which meet and discuss snow removal procedures and techniques; throughout that meeting, they are looking for innovation. They are looking for better ways to do the job. They exchange ideas.

I think that if you got into standardization, "thou shalt do it in a particular way," you would end up with a worse situation.

Quite frankly, those that would make the regulation have less expertise in this area than we do.

Now, who would make the standard? Who would set the standard? That is our problem, sir.

Mr. Glickman. Is it true, I assume since the Federal Government does not operate most of the airports in this country, they are operated by public airport authorities for the most part—let me rephrase the question.

Is there significant difference in the management style and operation of airports in this country, major air carrier airports?

Either one of you could respond.

Mr. Michael. I would not phrase it that way, Mr. Chairman. I would say there is a difference in the intensity of use of certain airports.

Certainly an airport like Washington National or Denver that I am associated with have a high level of use. Therefore, it is only natural to assume that the airlines and the public operating in and out of that airport are going to be insistent upon the maximum use of that airport whenever it is possible.

That translates into a higher level of maintenance and an effort on the part of airport management to maintain usable services when at all possible.

The same emphasis may not exist at a smaller airport, which, according to the book, operates according to the same criteria. He simply may not need to get out there at 2 o'clock in the morning and be sure the runway is totally clean, because he does not have a runway landing there until 7, whereas that may not be true at Stapleton.

Mr. Glickman. Let me switch subjects for a moment.

This subcommittee recommended distance-to-go markers to major commercial airports last year. They don't exist in most airports. They do at some Air Force bases.

I wonder how you all would feel about putting distance-to-go markers on airports.

Mr. Hoyt. Well, I think basically if it is the consensus of pilots or the airline operators that runway distance markers serve a useful purpose, we will put them in. That is a general statement.

I say this. Back in 1975, FAA came out with proposed rulemaking on runway distance marking; at that time, in response to that, we made inquiries of pilots and airline operators and so on and found a very wide variance in opinions of the usefulness of those markers.

Quite frankly, many of them said that when we are busy taking off, particularly when they are most needed, in other words, in adverse conditions, who is looking out the window checking runway distance markers?

I am not a pilot and I can't comment on that, but it seems to me there must be much better way of advising the pilot as to runway length than having billboards out a certain distance, particularly when he actually would have to change his concentration and line of vision to pick that information up.

However, as I say, if it is the consensus of all those who use the airport that runway distance markers are necessary, then I think you will find that they will be installed.

Mr. **Glickman**. I wonder if, finally, you might give us your views of microwave landing systems.

Mr. **Michael**. In my judgment, and I think AOCI's judgment, MLS represents a major step forward with respect to capacity and safety.

We support its implementation at the earliest possible date.

Mr. **Glickman**. We thank you for your participation and appreciate your being here.

Our next witness is Dr. Raymond Colladay, Associate Assistant Administrator at NASA. Dr. Colladay has been a witness here many times before.

I think you are going to show a video tape. Are you going to do that in the beginning of your testimony?

STATEMENT OF DR. RAYMOND COLLADAY, ACTING ASSOCIATE ADMINISTRATOR, OFFICE OF AERONAUTICS AND SPACE TECHNOLOGY, NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

Dr. **Colladay**. What I had planned to do, Mr. Chairman, if it is all right with you, is submit my prepared testimony for the record. I think it would be more interesting and valuable for you if I just summarize that.

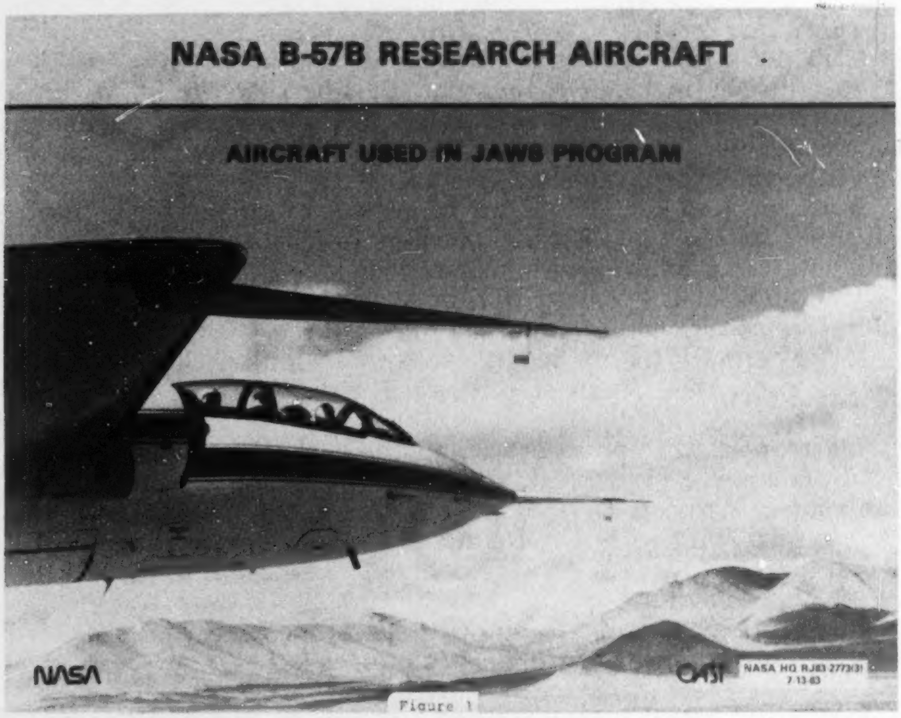
Mr. **Glickman**. That is fine. Your entire statement will appear in the record.

We appreciate your preparing it.

Dr. **Colladay**. The video tape will be nested in the midst of some view graph material, too, that I have included for visual aids. This may be rather difficult. I don't know if they will show up on the wall.

Mr. **Glickman**. Let's try it. Let's turn some of these lights off, please.

Dr. **Colladay**. I would like to highlight some of the recent results and focus the program on some of the NASA research related to airport safety and terminal operations.



NASA B-57B RESEARCH AIRCRAFT

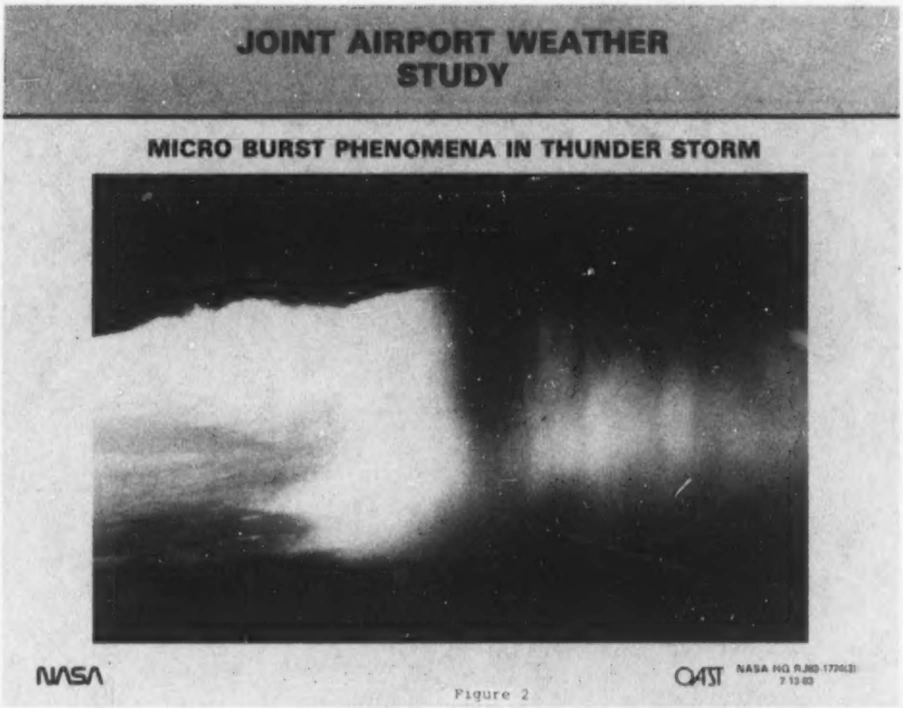
AIRCRAFT USED IN JAWS PROGRAM

Figure 1

Here you see an aircraft used in the measurement of hazardous low-altitude wind shear. Figure 1 is a B–57 research aircraft operating out of the Ames Research Center/Dryden Flight Research Facility equipped to measure low-altitude turbulence, span wide variation and gusts, you can see the two probes, one on the wing tip and one on the fuselage nose. Although it does not show up very clearly there, it indicates a detailed pressure pattern that we can evaluate and measure wind velocity gradients in some detail.

We have used this in the joint airport weather studies [JAWS] program where we have been able to acquire the data on high velocity gradients to use in wind shear modeling.

Also onboard was an infrared radiometer that was used for detecting temperature variations ahead of the aircraft as a possible indication of wind shear.



JOINT AIRPORT WEATHER STUDY

MICRO BURST PHENOMENA IN THUNDER STORM

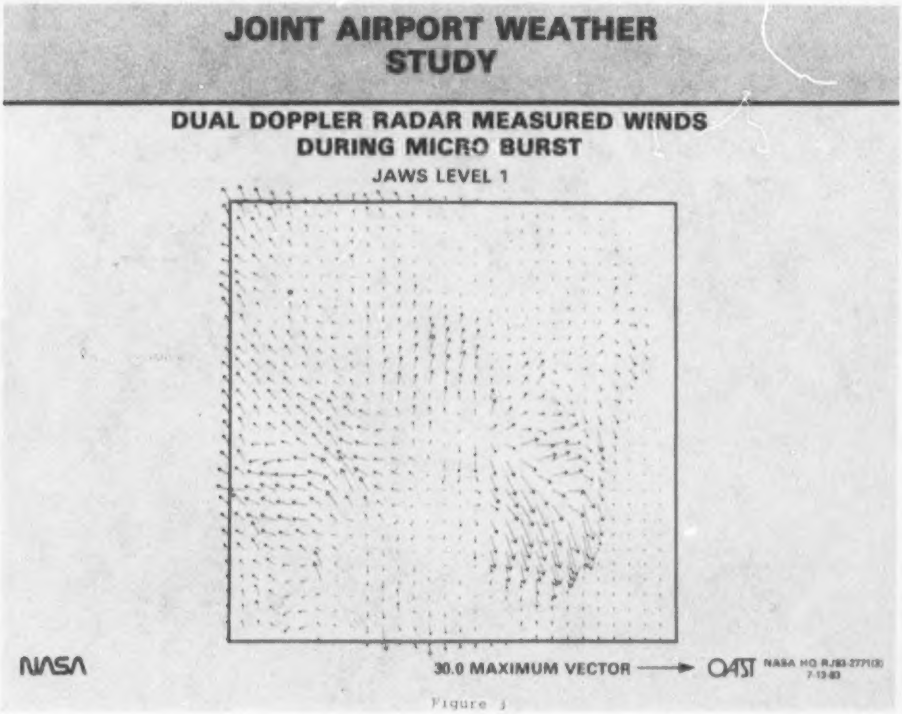
NASA

OAST

NASA HQ RJ83-1770(3)
7-13-83

Figure 2

Figure 2 illustrates a typical phenomena that we refer to as microburst structure; that is made visible by the falling rain in the center. In the left part of the figure there is a high-velocity downdraft which is a column of cold air. When this downdraft occurs near the vicinity of the ground, it fans out in radial directions.



JOINT AIRPORT WEATHER STUDY

DUAL DOPPLER RADAR MEASURED WINDS DURING MICRO BURST

JAWS LEVEL 1

Figure 3

Figure 3 illustrates the effect of this microburst phenomena on the velocity gradient near the surface. In that 10 kilometer square area, you can see the velocity vectors. The length of some of these indicates a velocity of 30 meters per second which is equivalent to 60 knots. If an aircraft were flying from left to right, it would experience wind velocity variations over that short time period of 30 meters per second in one direction, to zero, to 30 meters per second in the opposite direction.

This is a very short-lived dynamic phenomenon. We need to be aware of its existence so we don't deliberately fly through these wind conditions.

The JAWS data and the B-57 flight data are now being programmed in the Langley flight simulator.

If I can back up now and look at the somewhat broader scale, we are investigating with our advanced transport operating systems program research areas relating to the integration of airborne capabilities with the evolving National Airspace System.

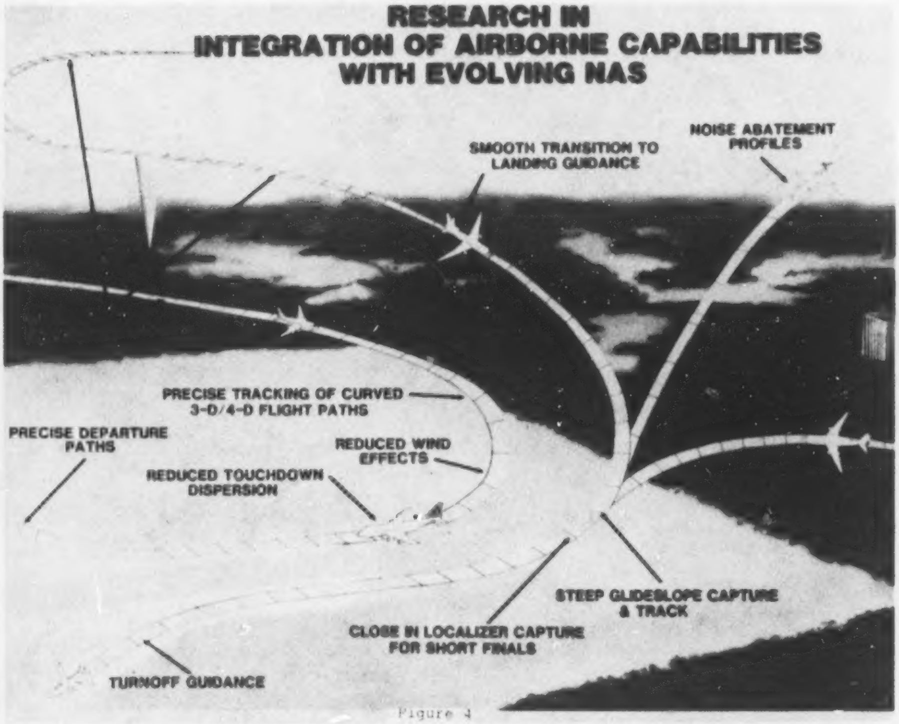

RESEARCH IN
INTEGRATION OF AIRBORNE CAPABILITIES
WITH EVOLVING NAS
SMOOTH TRANSITION TO LANDING GUIDANCE
NOISE ABATEMENT PROFILES
PRECISE TRACKING OF CURVED 3-D/4-D FLIGHT PATHS
PRECISE DEPARTURE PATHS
REDUCED WIND EFFECTS
REDUCED TOUCHDOWN DISPERSION
STEEP GLIDESLOPE CAPTURE & TRACK
CLOSE IN LOCALIZER CAPTURE FOR SHORT FINALS
TURNOFF GUIDANCE

Figure 4

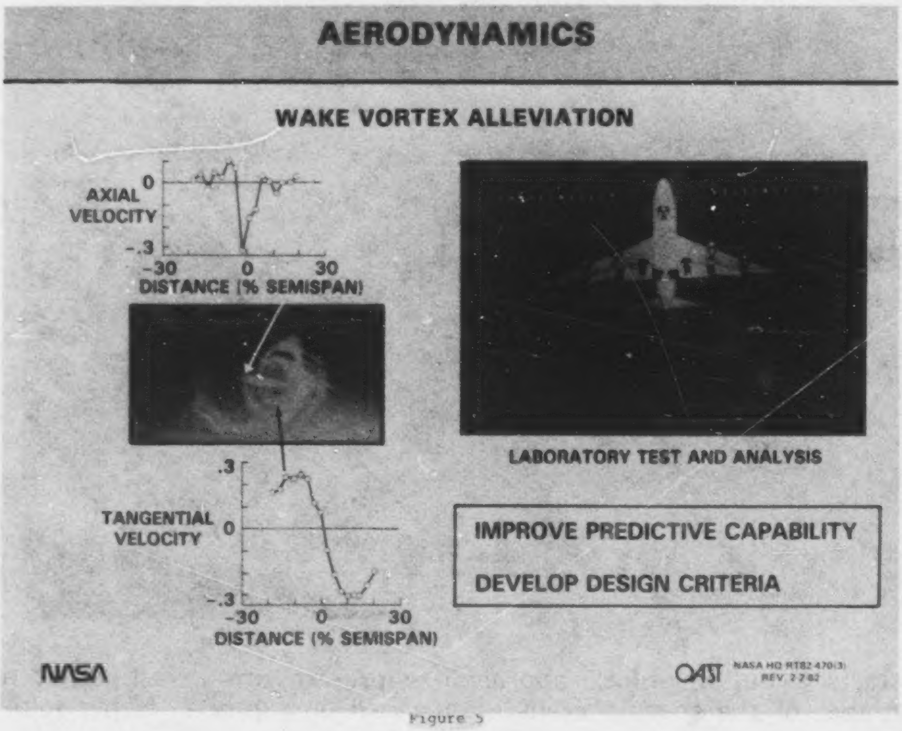
It is a building-block approach where we are investigating a number of the specific areas highlighted on figure 4. Using four-dimensional navigation control, we have demonstrated in the air traffic control system at Fort Worth and Denver the ability to bring an aircraft to a precise point in three dimensional space at a precise time. In fact, we have demonstrated the ability to bring an aircraft in with these advanced guidance systems to the end of the runway with a plus or minus 4-second deviation.

Another is improved algorithms for flare and touchdown guidance have reduced the runway touchdown dispersion by an order of magnitude from 1,000 feet to 100 feet variation.

Another is integration of the capability that MLS guidance and airborne systems can provide, certainly, the ability to more effectively interleaf traffic in the terminal area. The digital integrated automatic landing system, which we refer to as DIALS, combine the capability for precise time constrained approach and landing through touchdown and rollout.

If we develop these navigation and guidance systems to support increases in terminal area capacity efficiency, and safety, then one has to ask, what are the limiting factors for close proximity of aircraft in the vicinity of the airport?

I would have to say that one of the most important limiting factors that we face right now, and which represents a tough technical barrier, is the wake vortex characteristics ASA has been investigating wake vortex phenomena over the years and we need to continue a fairly aggressive approach to not only understand the characteristics of vortex shed from the wake of transport aircraft, but also to detect their presence and avoid them if possible.



AERODYNAMICS

WAKE VORTEX ALLEVIATION

LABORATORY TEST AND ANALYSIS

IMPROVE PREDICTIVE CAPABILITY

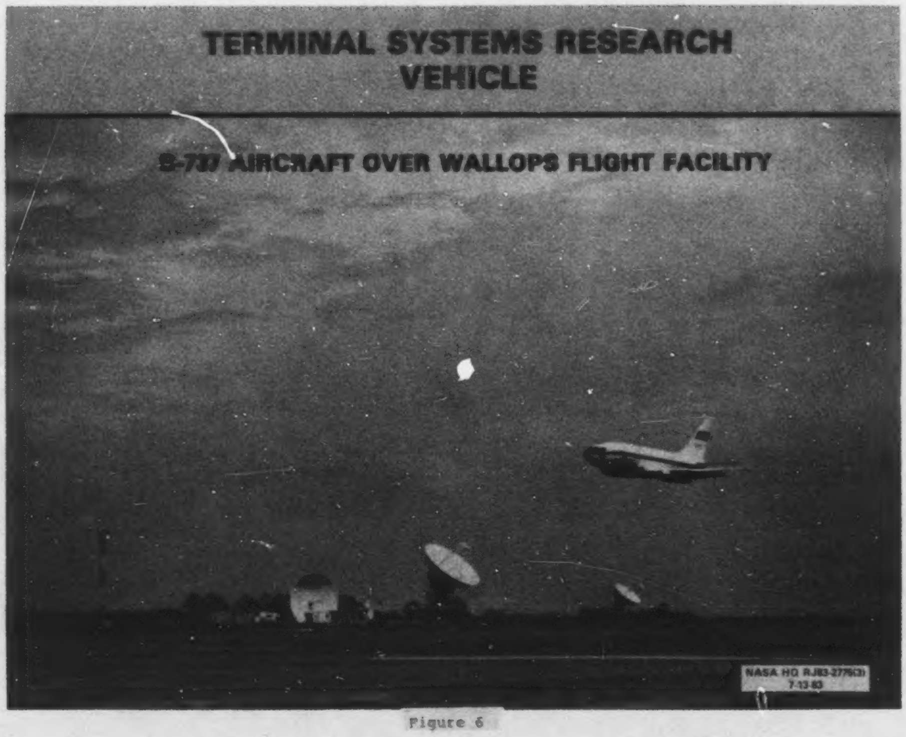
DEVELOP DESIGN CRITERIA

Figure 5

Figure 5 illustrates some of the research results that we have had in the past programs to indicate that there are some very significant velocity gradients that are encountered, particularly from wide-bodied aircraft. Here you can see both the axial velocity and the tangential velocity vary on the order of 30 percent of the free stream forward speed of the aircraft.

On the right is shown a wind tunnel model at Langley generating a vortex marked by smoke. It is not too visible there, but that kind of data helps us to get the measurements that we can use to help correlate the research results with the analytical predictions.

In September, we plan to hold an interagency workshop on the subject of remote detection of wake vortices: so there are really two elements of the NASA program, alleviation and detection and avoidance.



TERMINAL SYSTEMS RESEARCH VEHICLE

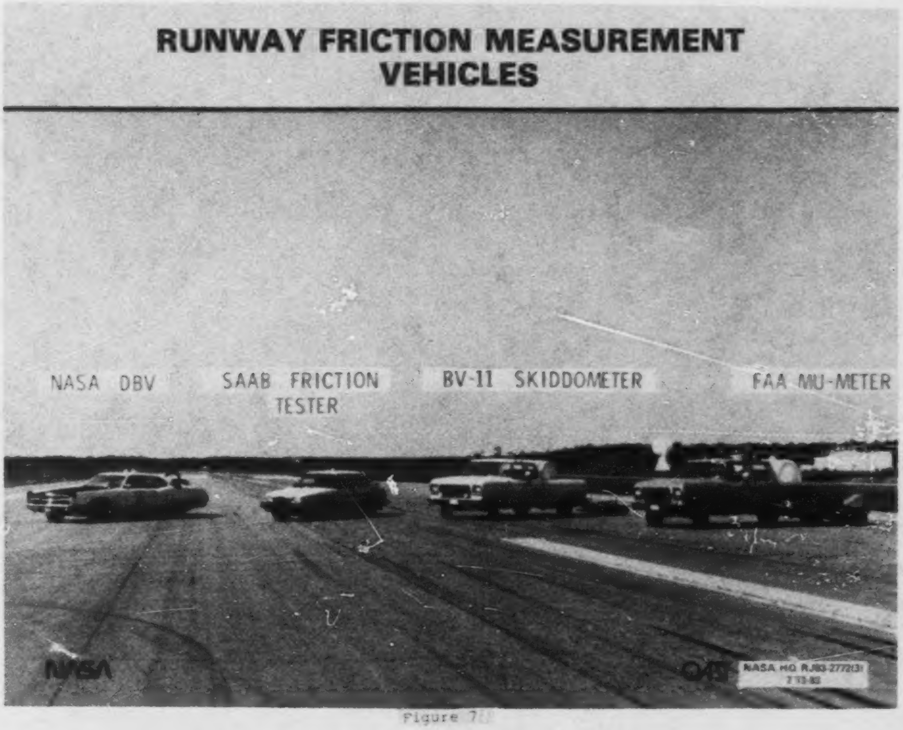
B-737 AIRCRAFT OVER WALLOPS FLIGHT FACILITY

NASA HQ RJ83-2776(3)
7-13-83

Figure 6

Next, I would like to comment briefly on the work that we are doing on aircraft runway characteristics and friction measurements. Figure 6 shows NASA's Boeing 737 terminal systems research vehicle. It is a research aircraft being used in the joint NASA FAA test to correlate ground vehicle runway friction measurements with actual airplane stopping performance.

The first series of tests were run last month using the research runway at Wallops flight facility which contains 12 different runway surface textures and the capability for maintaining precise levels of water depth. Subsequent tests will include conditions this winter on snow and ice, and will cover a series of operational runways.



RUNWAY FRICTION MEASUREMENT VEHICLES

Figure 7

The test procedure is to measure the runway condition with all four of the standard test vehicles shown in figure 7 prior to and after the landing of the instrumented test airplane. The video, if it is ready, shows this series of tests with the 737 landing on the Wallops runway followed by the four test vehicles.

It is through the building of this data base, then, that we can provide the correlation between actual aircraft performance and measurements on the runway.

[The video tape is shown.]

Dr. Colladay. Here you see the test aircraft. There is a little bit of interference on the video tape. There is water spray that is not that visible, but you can see it coming off the rear tires. The aircraft will be followed by the sequence of test vehicles.

The last test vehicle was the NASA Langley diagonal braking vehicle where the vehicle actually stops. It did not show too clearly.

Following the tests we are conducting now with the 737, we will be using the FAA-727 aircraft, and hopefully, this fall L-1011 test airplane will be used to gather data over a wider spectrum of aircraft size operational runways.

In discussing terminal area and aircraft systems, I must also highlight some of our simulation efforts that are extremely important in the overall conduct of our research effort.

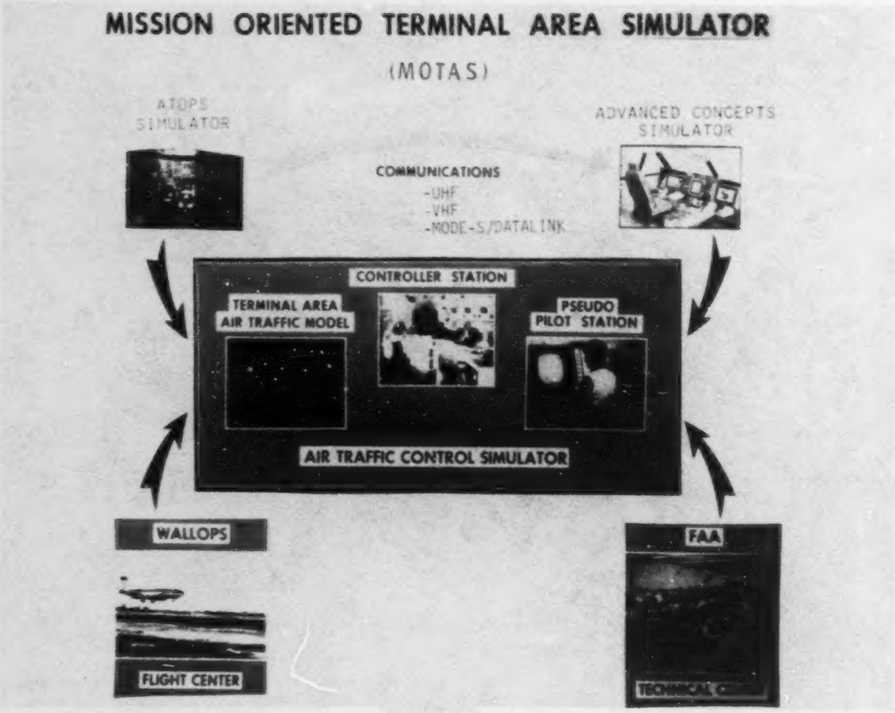
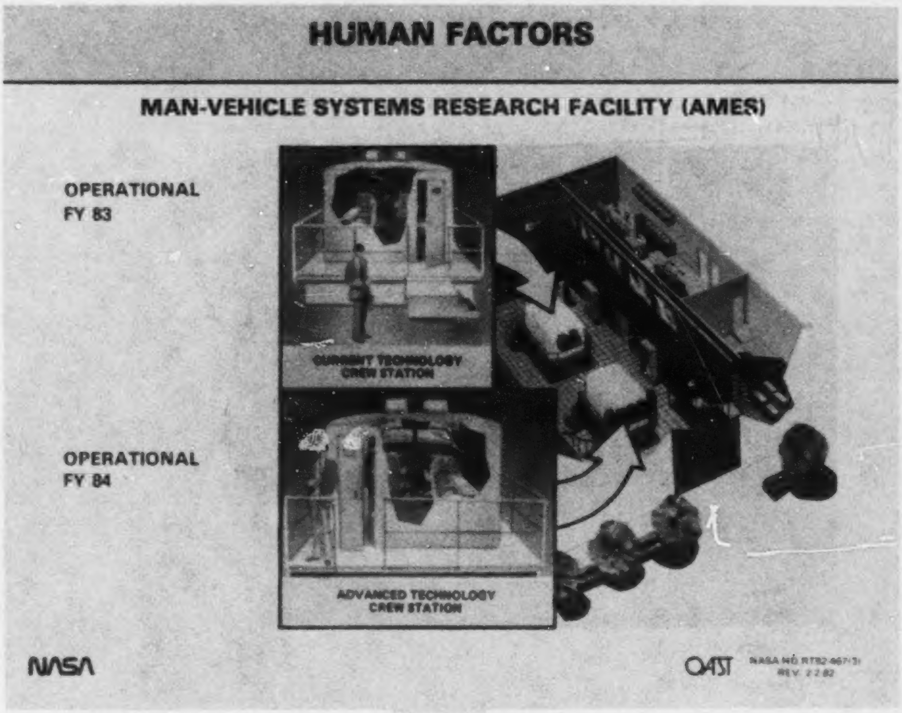

MISSION ORIENTED TERMINAL AREA SIMULATOR
(MOTAS)
ATOPS SIMULATOR
ADVANCED CONCEPTS SIMULATOR
COMMUNICATIONS
-UHF
-VHF
-MODE-S/DATALINK
CONTROLLER STATION
TERMINAL AREA AIR TRAFFIC MODEL
PSEUDO PILOT STATION
AIR TRAFFIC CONTROL SIMULATOR
WALLOPS
FLIGHT CENTER
FAA
TECHNICAL

Figure 8

Figure 8 shows some of the elements of the mission oriented terminal area simulation capability. It is more of a capability than a particular simulator device. It includes an advanced cockpit simulator, simulation of the advanced transport operating system aircraft, flight operations in simulated terminal areas and air traffic control procedures and instructions coming from direct linkage with the FAA technical center or from onsite ATC control station simulators at both Langley and Ames Centers.



HUMAN FACTORS

MAN-VEHICLE SYSTEMS RESEARCH FACILITY (AMES)

OPERATIONAL
FY 83

OPERATIONAL
FY 84

CURRENT TECHNOLOGY
CREW STATION
ADVANCED TECHNOLOGY
CREW STATION
NASA
OAST

Figure 9

Figure 9 illustrates a very key and central piece in that simulation capability, the new man vehicle systems research facility that will be operational this year at Ames Research Center, able to duplicate full mission crew and air traffic control interactions for our human factors research.

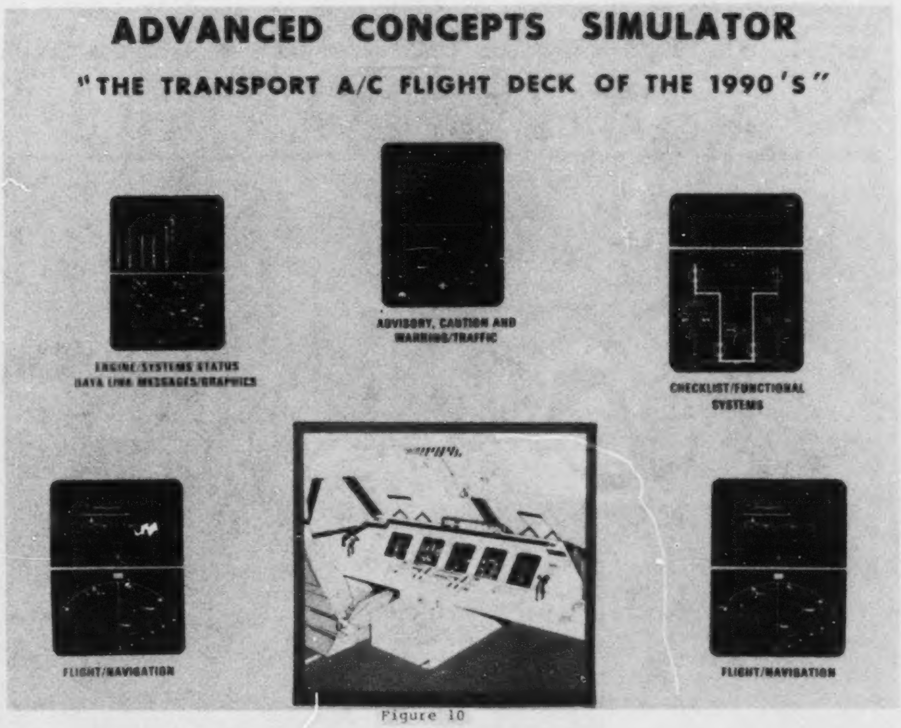

ADVANCED CONCEPTS SIMULATOR
"THE TRANSPORT A/C FLIGHT DECK OF THE 1990'S"
ENGINE/SYSTEMS STATUS
DATA LINK MESSAGES/GRAPHICS
ADVISORY, CAUTION AND
WARNING/TRAFFIC
CHECKLIST/FUNCTIONAL
SYSTEMS
FLIGHT/NAVIGATION
FLIGHT/NAVIGATION

Figure 10

Initial operating capability will be around a current technology crew station, a 727 cab. This will be followed by an advanced technology crew station that is shown on the next figure 10. Identical versions of this advanced concepts similar will be integral to both the Ames facility and the simulators at Langley now being installed. They will be used for research on cockpit organizations, control modes, and display devices in a format that is expected in the 1990's.

Advanced concepts simulator will become an additional facet of, as I said, both the simulators at Langley and Ames.

I would like to mention the aviation safety reporting system [ASRS]. The program is proceeding very well, providing a valuable data base for both NASA for our human factors research as well as an important data base on airport safety and aviation safety to the FAA. NASA is the administrator of the program for the FAA through an agreement dating back to 1975.

Some 260 of the 772 alert bulletins that have been issued by ASRS since its inception have been in specific categories of airports and terminal area operations.

Finally, I would just be remiss, in a discussion of airport capacity and terminal area operations, if I did not mention that vehicle technology will continue to change and provide increased airport capacity and improved terminal area operations. The aircraft system is driven by the same factors of increased efficiency and capacity as the aviation system as a whole.

NASA OAST

QUIET SHORT-HAUL RESEARCH AIRPLANE (QSRA)

One such example is the QSRA, or quiet short haul research airplane shown in figure 11, that I know you are familiar with. This aircraft, when equipped with advanced guidance and control technology, has demonstrated the maneuvering capability and landing performance that is now available only to very small aircraft.

Such capability could be used to operate around conventional CTOL traffic and significantly increase the effective capacity of existing airports.

The technology embodied in QSRA has proven very effective and reliable and, as you know, it flew to the Paris Air Show this spring. We have operated this aircraft from an aircraft carrier without arresting gear to show its performance on short landing and takeoff distances, and it is easy to operate, as we get the feedback from guest pilots.

Mr. Chairman, that concludes the remarks I was going to make and I would be happy to answer any questions you might have.

Mr. Glickman. Thank you.

[The prepared statement of Dr. Colladay follows:]

HOLD FOR RELEASE
UNTIL PRESENTED BY
WITNESS
JULY 18, 1983

STATEMENT
OF
DR. RAYMOND S. COLLADAY
ACTING ASSOCIATE ADMINISTRATOR FOR
AERONAUTICS AND SPACE TECHNOLOGY

NATIONAL AEROANUTICS AND SPACE ADMINISTRATION

before the

Subcommittee on Transportation, Aviation
and Materials
Committee on Science and Technology
House of Representatives

Mr. Chairman and Members of the Subcommittee:

I welcome this opportunity to appear before you to discuss NASA research and technology programs that address the important subject of aviation safety in and around airports. Aircraft operation at the airport and in the surrounding terminal airspace is by far the most critical in terms of safety and it is an area in which large losses in efficiency can occur. As air traffic and terminal congestion continue to grow, even greater effort will be required to sustain adequate levels of safety for the traveling public. NASA research, while primarily oriented toward vehicle characteristics, airborne systems, and cockpit human factors, includes a number of programs directed at aircraft operations in the terminal area and on the runway. This research bears importantly on both airport safety and capacity. In the remainder of this statement, I will summarize the key elements of the NASA programs relevant to this subject, and I will end with some comments regarding the potential future benefit to airport capacity from certain advanced vehicle concepts.

Improvements in the precision and detail of weather information in the terminal area represent a serious need, as has been illustrated by several recent accidents. For example, the hazards posed by low altitude wind-shear have recently become the focus of renewed attention throughout the aviation community, prompting the Congress to direct the FAA to sponsor an in-depth study of the phenomena by the National Research Council. Extensive research has been underway for several years in a number of agencies to forecast and detect the wind-shear from both the airplane and the ground. The NASA research is focused on airborne remote detection and the development of better models for use both in training simulations and in advanced controls and displays. Unique flight research aircraft and simulators are being used to obtain data which will help better characterize this short lived, dynamic meteorological hazard and to investigate crew procedures for its avoidance or minimization. NASA, in cooperation with the FAA and the National Center for Atmospheric Research (NCAR), is currently analyzing data from the Joint Airport Weather Studies

(JAWS) program. As you recall, during the JAWS program, the ground based doppler radar characterized potentially hazardous wind-shears in the Denver area. Simultaneous penetration by the NASA B-57 probe aircraft yeilded a complete data package from which the necessary analytical models can be constructed. Wind-shear profiles based on the JAWS data will be used by the FAA and the airlines to upgrade the wind-shear models incorporated in high-fidelity flight training simulators. A more accurate portrayal of wind-shear should substantially increase aircrew awareness of the conditions under which this infrequent but potentially hazardous event can occur, and permit the establishment of flight procedures for coping with it when it does. In a parallel effort, we are exploring the possibility of detecting low-altitude wind shear by application of airborne doppler radar technology which proved successful in recent in-flight NASA wind and turbulence detection experiments at cruise altitudes. In cooperaton with the FAA and the industry, we plan to continue an aggressive effort on both detection and avoidance of wind shear.

Flight operations in the terminal area have been the subject of intensive NASA research. The emerging capabilities now available in avionics, guidance systems such as MLS, and on-board computation hold significant promise for large increases in system and aircraft efficiency, while reducing the conflicts between aircraft in the crowded terminal area -- provided that these capabilities can be integrated into the air traffic control (ATC) system. The capability of the aircraft to respond to strategic guidance from the ground is being demonstrated in a building block fashion in the Advanced Transport Operating Systems (ATOPS) program. Already demonstrated is the ability to arrive at a predetermined point such as the runway threshold at a precise time while maintaining a fuel-optimum flight path. Flight tests in the Denver area verified an arrival time precision of plus or minus 4 seconds. The same guidance algorithms installed in the standard L-1011 flight management computer gave similar results in flight tests in the Dallas-Fort Worth area.

Improved precision in the landing flare and touchdown has been accomplished in an automatic flare guidance program which has reduced touchdown dispersion from 1000 to 100 feet. This order-of-magnitude reduction in dispersion is both a significant safety improvement and a necessary first step in reducing the runway occupancy time. Other steps, such as rollout guidance and automatic high speed turn offs, have been identified as topics for additional research.

The achievement of desired increases in capacity requires improvements in control precision throughout the entire range of terminal operations. The Digital Automatic Landing System (DIALS) program is a simulation and flight research program that is concentrating on control laws that feature low overshoot performance and precise path conformance. Ultimately the concept will provide the ability to conduct parallel instrument approaches with substantially reduced lateral separation. The flexibility of the guidance information available through the MLS, when coupled with onboard computation now available, provides a potential for interleaving traffic in the terminal area in a more nearly optimum manner. In another element of the program, the effectivness of displaying traffic information in the cockpit as an aid to more efficient terminal maneuvering is being investigated by NASA and the FAA. The incorporation of these advanced airborne capabilities into an Integrated Flow Management System is also being studied.

Given the capability to improve airport capacity dramatically by reducing the spacing between aircraft in the terminal airspace, it becomes essential to solve the problem of avoiding vortices shed by preceding aircraft. NASA, in conjunction with the FAA, is investigating means for alleviating and avoiding wake vortices to ensure safety along with the reduced spacing. The primary NASA concentration is in pursuit of alleviation techniques. In response to a recent FAA request, however, we are also preparing to assist in exploring possible techniques for the cockpit display of either ground- or airborne-sensed vortex location.

The relationship among the pilot, aircraft, and non-standard runway conditions has been the subject of a long-term NASA research effort. Through the use of several unique facilities at the Langley Research Center and the Wallops Flight Facility, significant contributions have already been made to more effective aircraft braking. In direct response to the August 1982 recommendation of this Subcommittee, the current emphasis in the NASA tire traction and braking program is on the correlation of runway surface condition measurements and the braking performance of an aircraft under a variety of runway conditions. The first phase of this NASA/FAA/Industry program was initiated on June 1983. The tests were conducted on the research runway at the Wallops Flight Facility using the four standard runway friction measuring vehicles before and after landings of the highly instrumented B-737 Terminal Systems Research Vehicle (TSRV). The unique capabilities of the research runway include 12 different, well calibrated runway surface treatments with the ability to maintain precise levels of moisture for the tests. Test runs were also conducted on an operational runway at the FAA Technical Center at Atlantic City. Data are now being analyzed. This fall and winter we will perform additional tests under the more adverse conditions of snow and slush covered runways. When complete, the data from this program will provide a firm basis for measuring and reporting the runway conditions in terms that are meaningful to pilots for both take-off and landing operations. The same data base will provide for more accurate training simulation and will generate greater pilot awareness that is vital to enhanced operational safety.

Thus far, I have concentrated on the flight research efforts. Each of these activities, however, is supplemented by extensive ground based simulation. The TSRV facility consists of both the B-737 flight vehicle and an identically configured ground simulation cab that is represrentative of advanced jet transports such as the B-757/767. The simulator is heavily employed in the precursor exploration of new concepts for display formats, control automation, and advanced operating techniques as well as in the detailed planning, training, and evaluation that is an integral part of each flight program. A second key facility in the ATOPS program is the Mission Oriented Terminal Area Simulation (MOTAS). This facility is a complex comprising ATC Controller stations, manned cockpits, pseudo-pilot stations and a computer-generated traffic model. These

MOTAS elements function interactively to provide a realistic ATC environment for simulation studies aimed at improving system safety, efficiency and capacity. Emphasis is on operations in the high-density terminal area providing the capability to evaluate a wide range of advanced flow control strategies, cockpit displays of traffic information for self spacing and monitoring, procedural techniques for coping with wind-shear hazards, and runway occupancy time reduction, all with realistic interactions with other traffic and controllers. Two additional facilities now under development for use in this area will materially add to the capability for finer-grained study and analysis of the crew/vehicle/system interface. The Advanced Concepts Simulator, with identical units at the Langley and Ames Research Centers, will provide a facility for exploring the cockpit design and functional requirements for the next-generation aircraft. Future addition of a wide angle computer-generated visual display capability to the ATOPS facility will improve the ability to examine the area of combined visual and electronically augmented information as a function of terminal area operations.

The importance of ground-based simulation is apparent in all facets of NASA's research on operations, safety, and human factors in the terminal area. At the Ames Research Center, which is the lead center for human factors research, the large complex of sophisticated research flight simulators is now being augmented by completion of the Man-Vehicle Systems Research Facility (MVSRF). The MVSRF contains a B-727 simulator with visual and motion systems, the Advanced Concepts Simulator with visual system, an ATC simulator, and several pseudo-pilot stations. The 727 cab will permit full-mission, full-workload simulation in a conventional current cockpit. The advanced cab, with a full complement of modular advanced electronic display and control systems, will support crew/cockpit interface research using future scenarios in the evolving National Airspace System. Initial research in the MVSRF will include full-mission simulation studies to investigate the effects of fatigue and circadian desynchronosis (jet lag) on crew performance, with emphasis on determining the likelihood of fatigue-related errors in information transfer.

Apart from its importance to NASA's research, simulation plays a significant role in the transfer of safety research results to the aviation community. We work closely with the FAA and the airlines to ensure that each new step in our understanding of operational safety hazards such as wind shear and degraded wet-runway stopping performance is defined in such a way that it can readily be incorporated into airline training simulation. Similar care is taken to make certain that promising advanced concepts in displays or systems management evolving from the systems or human factors research can be simulated and evaluated by designers and users in new aircraft development programs.

One of the responsibilities associated with NASA's safety research activities is the Aviation Safety Reporting System (ASRS), an incident reporting program designed to identify issues and hazards in the national aviation system. The program is administered by NASA for the FAA under an agreement initiated in 1975.

The ASRS is a voluntary, confidential, non-punitive incident reporting system that has succeeded in obtaining information marked by honest self-appraisal of pilot and controller performance as reported by the performers themselves. The system is capable of converting raw incident data into safety information for both long and short term use by the FAA, NASA, NTSB, and other elements of the aviation community. Output of the ASRS, apart from its educational and training value, provides a data base for human factors and systems research.

While the ASRS data base contains information dealing with all aspects of aviation operations, the specific categories of airports and terminal area airspace operations have produced a substantial body of safety data. Of the 772 Alert Bulletins issued by the ASRS on all phases of aviation operations, 260 have dealt with possible problems in the terminal environment. The following examples indicate the variety of potential airport safety hazards reported in these bulletins:

> Alert Bulletin 79-69 alerted the FAA to ATC, traffic, airspace, and language problems being experienced by pilots and controllers in the area of Tucson, Arizona.
>
> Alert Bulletin 83-12 notified the airport management at Philadelphia International Airport of alleged hazards to passengers in the area of the commuter airline gates due to a mix of aircraft and people.
>
> Alert Bulletin 83-11 cautioned the airline industry on the need for additional care in those instances when air carrier aircraft use the "power-back" maneuver to exit terminal gates.

ASRS data has reaffirmed the importance of accurate and timely information identifying known or forecasted terminal-area problems such as wind shear, wake vortices, and severe weather. It has highlighted the continuing occurence of runway incursions (two or more aircraft on an active runway) as a result of pilot, controller, and management errors. ASRS studies have also emphasized the need for improved construction and display of terminal area approach courses and descent profiles, and have called attention to potential problems associated with missed approaches or go-arounds. Ironically, it appears that this latter problem may have resulted from the fact that transport approaches have become considerably more reliable -- that is, the missed approach has become an infrequent event and therefore a greater surprise to both controllers and other pilots in the terminal area.

To further enhance the value of the ASRS as a basis for strengthening NASA's aviation safety, flight systems management, and human factors research, we have recently implemented a trend analysis technique in which ASRS incident data is used to identify emerging problems in all operational environments -- with particular emphasis on the airport and terminal area operations because of the high percentage of reports involving those operations.

As new technologies are developed and as greater capability for communication and precise navigation emerge there will be changes to the aviation system to meet the ever increasing demand for more capacity. The National Airspace System modernization effort is certainly a large step in that direction. Our research efforts are reviewed with the FAA and the industry constantly to make certain that they continue to be in harmony with the evolving airspace system with respect to airborne systems integration, operational concepts, and man-machine relationships in an increasingly automated air traffic control system.

Vehicle technology will also change, driven by the same demands and limited by the same constraints of congested airspace, limited runway capacity, and crowded ramp and gate areas. The emergence of an airplane with the capability for high maneuverability, short runway requirements, and efficient cruise capability would have the potential for major increases in the passenger capacity of many of our existing airports. The powered-lift technology embodied in the Quiet Short Haul Research Aircraft (QSRA) represents one possible step toward such a capability. The QSRA using MLS guidance has been able to reliably demonstrate both maneuvering capabilities and short take-off and landing performance that would permit increased operations at hub airports by allowing high-performance short-haul jet transports (e.g. 100-150 passenger size) to use short runways such as those currently used at some major airports by smaller commuter aircraft. Fully developed and utilized, this technology has the potential of providing the increased capacity without interference with conventional transport operations and without causing additional noise in the terminal area.

NASA's research efforts, together with those of other government agencies and the aviation community, address the most critical of the safety problems in and around the airport. The U.S. air transportation system is the safest and most efficient in the world. Consequently, changes must be very thoroughly examined to insure that a solution in one area does not create a greater hazard in another. For this reason, the introducton of changes based on research progress may at times appear slow. Changes are taking place, however, improvements are being made, and it is essential that we continue the research which will make still further improvements possible in the future.

Mr. **GLICKMAN**. When do you expect to complete the research on runway friction correlations with airplane landing operations?

Dr. **COLLADAY**. The NASA testing will be completed in the summer of 1984.

We have to go through the winter months to get, as I indicated, the kind of runway conditions typical of slush and snow operation and then some tests next spring using the L-1011 aircraft and other runways.

But our test program is scheduled to end in the summer of 1984.

Mr. **GLICKMAN**. I want to move just a moment to wind shear. Acknowledging the Doppler technique for wind shear detection and its attractiveness and its long development, why doesn't NASA accelerate the available low-cost, near-term interim of remote temperature gradient sensing mechanisms and methods?

Dr. **COLLADAY**. Well, we are exploring a number of on-board wind-shear sensing devices and looking at the application of onboard aircraft Doppler radar technology that has been used to date at Langley for both airborne and ground sensing of winds.

We are exploring a number of sensing devices that might be considered for onboard detection, at least detecting the presence of the velocity gradients to alert the pilot that there is something to be concerned about, if not a detailed pattern itself.

Mr. **GLICKMAN**. Well, again, acknowledging Doppler techniques, I would be interested in your accelerating downburst and wind shear detection techniques by simple ground temperature mapping as well.

I don't want to so overly sophisticate these things. We may have some techniques that we can use in the short term and I don't want to eliminate that, and I would hope that you are focusing on those things as well.

Dr. **COLLADAY**. Yes, sir, we are.

Mr. **GLICKMAN**. I want to thank you for your testimony. Your entire testimony will appear in the record.

There are some very useful things that appear in there that we are interested in on airport safety. We appreciate your being here.

Dr. **COLLADAY**. Thank you.

Mr. **GLICKMAN**. Our last witness today is Frank Foster, chief pilot for Ransome Airlines, and we are appreciative. I may have flown with you before. I am glad you are here.

Your stratement is short so you may read it or summarize it as you deem appropriate.

STATEMENT OF FRANK FOSTER, CHIEF PILOT, RANSOME AIRLINES, NORTH PHILADELPHIA AIRPORT

Mr. **FOSTER**. I do plan to shorten it, in the interest of saving a few minutes.

To give you a little background on Ransome Airlines, it is a commuter airline started in Philadelphia 16 years ago. For 12 of those 16 years, we were an Allegheny commuter so the corporate identity was masked during that timeframe.

In June of last year, we separated from U.S. Air and that agreement. We have signed a separate-type contract with Delta and we have been marketing our product under our own name.

Further background on why we were involved in advanced technology avionics in aircraft was because of the controllers' strike in August 1981. During that timeframe, Ransome Airlines was hit by three very significant modifications to our current passenger loads. The first was the PATCO strike. The second was our separation from U.S. Air, and then the third was the state of the economy. The first two problems were, without question, the most difficult to overcome.

The most difficult was the PATCO strike. Every single line operation that we conducted on a daily basis touched a major hub airport that was now restricted by FAA, slots, or flow control.

We looked at this strike as a crystal ball into the future. We anticipated the delays and the overcrowding of airports, airport access ramps, runway acceptance rates, et cetera, and the strike kind of brought everything to the forefront. So it made our long-range planning now become short-range planning.

In 1975, Ransome Airlines involved themselves in a joint effort with de Havilland Aircraft of Canada to look for ways to bypass the normal aircraft arrival routes and therefore avoid some of these delays.

From these discussions the separate access landing systems which are abbreviated "SALS" were developed. Basically the SALS concept is a simple one. It allows slower, smaller, and more manuverable aircraft at the major airports to land on unused runways which are not long enough to accommodate the larger jet aircraft. This allows for not only faster arrivals for the SALS aircraft, but also the primary jet traffic because the SALS traffic is now out of the way of the primary instrument runways.

The initial SALS approaches rely heavily on STOL characteristics, RNAV and the MLS to achieve success. I will give a very brief explanation of each one of these primary characteristics. STOL aircraft, short for short takeoff and landing aircraft, are designed with this function onboard. Typical jet aircraft require between 6,000 and 8,000 feet of runway. Typical STOL aircraft requires between 1,000 and 3,000 feet. We have eight of these STOL-type 50-passenger airplanes.

RNAV, area navigation, is a form of navigation which has been around for many, many years but always was and still is underutilized. Most aircraft navigate today by flying from fixed radio stations on the ground. They fly from one to another to another.

The problem with this type of navigation is that very few times are those radio stations laid out in a straight line toward your destination.

With RNAV, we use a microprocessor to triangulate fix information to lay a direct course to your destination. This will save time, fuel, and pilot workload. The RNAV that we have in our aircraft is a jet DAC 7000 RNAV commuter. The difference between this one and some of the others on the market is that this one has a preprogramable memory. You can program your entire route structure in the computer and it will stay there.

Microwave landing system, the new international standard for precision landing systems. It has many advantages over ILS: Initial cost, cost upkeep, flexibility, and accuracy. Flexibility is without question the most important for our type operation and you can, with it avoid obstacles and you can avoid noise-sensitive areas.

Ransome Airlines has been marrying these new technologies and new procedures to help alleviate present and future congestion problems. The FAA moves very slowly in these areas as they well should but because of the work and the advance technology that have been going on in the recent years, the FAA is now developing a program to expand the use of the SALS approach. Any industry must look carefully before investing time and money and should expect a reasonable payback for its investment. In this case we have an example of industry and Government working together to solve air space congestion problems, problems that ultimately will be beneficial to all segments of the air transportation industry.

Ransome Airlines has invested approximately half a million dollars in each of its DASH-7 aircraft for onboard computer-generated flight information. For us to continue to spend for high technology avionics, encouragement and payback must be realized. The first real encouragement we have seen was the recent Department of Transportation FAA exemption to the normal slot authorization for Ransome Airlines and Henson Airlines for STOL, RNAV departures from Washington National Airport.

We are currently developing a program to allow the same consideration to be given aircraft capable of the STOL approach and landing.

I would like to thank you for your attention and I will be glad to answer any questions on this.

[The prepared statement of Mr. Foster follows:]

In many industries the large companies with all their people and money should be the ones that make technological breakthroughs. But the smaller, more flexible, less bureaucratic companies are usually the ones to take the lead in pursuing new concepts. These new concepts tend to have a higher degree of effort required for there success and are more suited to the entrepreneurial spirit. Such has been the case in the Airline Industry with Ransome Airlines, a regional airline based in Philadelphia with flights to all the major airports from Boston to Washington, D.C. Ransome Airlines has been working with the FAA to change current Air Traffic procedures to take advantage of the new technology. Some of these procedures were written years ago with no insight as to what is technically possible in today's world.

Ransome Airlines started life in 1967 as a tiny commuter airline serving Philadelphia. And that the first few years were very difficult. Convincing the Giles and Ransome Board of Directors, a Caterpillar Equipment Dealership and originally the airline's parent company, of the long term profitability of a regional/commuter airline was difficult to say the least. Ransome Airlines learned many painful lessons the first few years and it was not until 1970 that things improved. That was the year Ransome Airlines joined the Allegheny Commuter system, a group of privately owned airlines all flying in conjunction with Allegheny Airlines (now USAir). With the marketing and corporate power of the larger airline now behind Ransome, the airline began to grow. By 1979 Ransome Airlines was awarded Air Transport World Magazine's Regional Airline of the year award and was the largest airline of its type in the United States. But the name Ransome Airlines never had much passenger recognition because of the affiliation with USAir as an Allegheny Commuter.

This changed on June 1, 1982, when Ransome Airlines entered into a relationship with Delta Airlines and began marketing itself under its own name.

All airlines are in a very turbulent era and Ransome is no exception. Ransome was hit worse than most airlines by a triple whammy; the PATCO strike, the reestablishment of its corporate identity, and the economy. The first two problems being the hardest to overcome. Ransome Airlines, although in business for 16 years, was perceived as a new airline since its corporate identity was masked for 12 years.

The other, and potentially more difficult problem, was the PATCO strike. In Ransome Airlines' case every one of its flight segments touched a major hub airport whose access was controlled by the FAA because of personnel limitations. These slot or access controls wreaked havoc with the airline scheduling. But Dawson Ransome, who supported the Administrations handling of the situation, felt that the strike was really a crystal ball look into the future. Airport access limitations, which were caused in 1981 by personnel shortages, showed what we might expect in the near future because of airspace, runway, and ramp limitations. With the improving economy, the skies will continue to become congested unless something is done now to help alleviate future problems. Ransome Airlines had been working on the airport access problem for years, with the PATCO strike dramatically bringing the problem to the forefront.

In 1975 Ransome Airlines, in conjunction with de Havilland Aircraft of Canada, began to look at ways to bypass normal aircraft arrival routes and therefore avoid delays. From these discussions the "Separate Access Landing System" (SALS) was developed. Basically the SALS concept is a simple one. It allows the smaller, slower, more manuverable aircraft at the major airports to land on the unused runways which are not long enough to accommodate the larger jet aircraft. This allows not only faster arrivals for SALS equipped aircraft, but also for the primary traffic because SALS aircraft are out of the main stream.

The initial SALS approaches rely heavily on aircraft STOL characteristics, Area Navigation (RNAV) and MLS, to achieve success. A brief explanation of each follows.

STOL - Short takeoff and landing. This is a function of the aircraft design. Typically jet aircraft require 6,000' to 8,000' for takeoff or landing. A STOL aircraft requires only 1,000' to 3,000'. (Ransome Airlines has eight of these aircraft in its 50 passenger de Havilland Dash 7's which can actually take off or land in under 1000'. This is a major accomplishment in an aircraft as large, comfortable and quiet as the Dash 7.)

RNAV - This is a form of navigation which has been around for many years but always was and still is underutilized. Most aircraft navigate by flying to and from fixed ground radio stations. The problem with this is that the ground stations are not always lined up on the route to the destination. This leads to a zig-zag route which wastes time and fuel. RNAV equipped aircraft use current ground stations and a microprocesser to triangulate a routing direct to the destination. Ransome uses dual Jet Electronics Technologies J.E.T. DAC 7000 RNAV computers. These RNAV computers were different than most because of their preprogrammable memory. This feature reduces pilot workload in the critical terminal area around the airport. These computers not only compute the new course, but by tying into the autopilot can turn, descend or climb the aircraft. The DAC 7000 will also tune the radios and virtually fly the entire flight as it was programmed in its non-volatile data base. These computers are the leading edge of data base navigation systems and will slowly help change the way aircraft navigate and are controlled by the air traffic controllers.

MLS - This is the new International standard precision landing system which allows the aircraft to land when the weather and visibility are bad. The MLS will slowly replace the ILS, the current precision landing system. The MLS has many advantages over ILS; initial cost, upkeep costs, flexibility and accuracy, to name a few. The MLS will allow more flexible precision approach paths which will avoid obstacles or noise sensitive areas which limit airport access.

Ransome Airlines is marrying these new technologies with new procedures to help alleviate present and future congestion problems. The FAA moves very slowly and cautiously, as it should. Because of the work and millions of dollars that have been expended, the FAA is now developing a program to expand the use of the SALS approach.

Any industry must look carefully before investing time and money and should expect a payback for its investment. With Ransome Airlines case an example of industry and government working together to solve airspace congestion problems, problems that ultimately will be benifical to all segments of the air transportation industry.

Ransome Airlines has invested approximately 500 thousand dollars in each of its DASH-7 Aircraft, for on board computer generated flight information.

For industry to continue to spend for high technology avionics, encouragement and pay back must be realized.

Our first encouragement was the recent Department of Transportation/Federal Aviation Agency exemption to the normal slot authorization for Ransome and Henson Airlines for STOL/RNAV departures from Washington National Aiport.

We are currently developing a program to allow the same consideration to be given aircraft capable of the STOL Approach and Landing.

Frank Foster

Director of Flight Operations/Chief Pilot

Ransome Airlines 13 years

Regional Airline

Based at Northeast Philadelphia Airport, Philadelphia, Pennsylvania

Holds an airline transport license with type ratings in the Nord 262 and the De Havilland dash-7. I have approximately nine thousand flight hours, 500 of which are as Pilot in Command in the STOL De Havilland Dash-7.

Prior to working for Ransome Airlines, I flew with the United States Navy as an Aircraft Commander in P3 type aircraft, for 6 years.

Graduated from Temple University Technical Institute in 1963 with a degree in Electronics.

Mr. GLICKMAN. I want to thank you for your testimony here today. I am impressed with your airline.

I think you are actually classified as the largest commuter airline in the United States?

Mr. FOSTER. Well, we were in 1979 and 1980. Since we separated from U.S. Air, we have significantly impacted some of our passenger loads.

Mr. GLICKMAN. What do you think can be done to accommodate STOL, RNAV, and MLS traffic at busy airports?

Mr. FOSTER. I think one of the things that the FAA can do to accelerate this would be to be a little bit more advance looking in some of their separation criterion. Right now the standard separation for horizontal separation between two IFR aircraft is 3 miles. We have been working at Washington National Airport on an STOL approach that comes into a microwave landing system approach for runway 33 since 1979.

The microwave landing system, I think, has been in about a year and a half. The RNAV has been in since 1979. We have redesigned that approach I think 10 times to insure that we don't infringe on the 3-mile horizontal separation on aircraft on the ILS aproach to runway 36. This is for simultaneous approach.

The 3-mile horizontal separation becomes a little ridiculous when you are talking about a mile or a mile and a quarter from the runway with an airplane that will not infringe on the runway 36 approach in any way, or on runway 36 after landing. The typical stopping distance for a fully loaded DASH-7 is about 1,000 feet. We have 2,400 feet before the intersection.

We have been operating since 1979 with STOL landings there. We have never infringed on the runway but we can't move the

FAA off of 3 miles horizontal separation which would allow us to get closer in lower ceiling conditions before we would have to miss the approach.

Mr. GLICKMAN. Let me ask you this question a little more technically first and maybe you might want to explain it. What is the percentage of economic penalty on your yield that you pay for all of this capability and is it retreivable under present circumstances?

Mr. FOSTER. I can't give you the percentage but I can tell you it is retreivable. We have operated between Philadelphia and Washington on a strictly RNAV route. We are outside of the VOR airways since 1979. With the approach designed the way it is, I would say about 80 percent of the time Washington National meets strict VFR limitations, so that you really do not require a precision instrument approach. You do require it because the ceiling is 1,000 feet, but the airport itself is technically VFR.

We can use our RNAV approach right now to those minimums. Without the RNAV in the airplane, we would be going down the river or up the river to get the daisy chain with all the 727's and everybody else that goes into Washington. We avoid that by having the separate approach. I think that we have probably recovered the cost of the avionics in at least two of the airplanes in avoiding that 20-mile trip down the river and a 20-mile trip back up the river just because we have a separate approach.

Mr. GLICKMAN. We appreciate very much your being here and I think your thoughts are extraordinarily useful both in terms of general technology and safety and the interrelation between a carrier like yourself and larger carriers and your input is important as we try to advise the FAA on what to do in the future.

Thank you very much for coming here.

Mr. FOSTER. Thank you.

Mr. GLICKMAN. That completes our hearing this morning. I appreciate all the witnesses coming.

[Whereupon, at 1:15 p.m., the subcommittee was adjourned.]

APPENDIX

ADDITIONAL MATERIAL SUBMITTED FOR THE RECORD

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: March 24, 1983

Forwarded to:

Honorable J. Lynn Helms
Administrator
Federal Aviation Administration
Washington, D.C. 20591

SAFETY RECOMMENDATION(S)

A-83-27 through -30

About 1015 e.s.t, on December 28, 1982, a Piedmont Airlines Boeing 737-200, operating as Piedmont Airlines (PI) Flight 200, was reported by numerous ground witnesses to have flown dangerously close to one of several tall buildings which reaches an elevation of 396 feet m.s.l. 1/ located at 1000 Wilson Boulevard in Rosslyn, Virginia. At the time, the flight was executing a VOR/DME 2/ instrument approach to runway 18 at Washington National Airport.

The runway 18 VOR/DME approach is a nonprecision approach in that no vertical descent path electronic reference is provided to the pilot. Approach altitudes, however, are regulated by the approach chart which depicts a series of stepdown descents from an altitude of 3,000 feet at the 10-mile DME fix down to 900 feet at the 3-mile DME fix. After the pilot has crossed the 3-mile DME fix, he can then descend the airplane to 720 feet, the minimum descent altitude (MDA) prescribed for the approach. The MDA of 720 feet must be maintained until at least one of the prescribed visual references for the runway of intended landing is distinctly visible and identifiable to the pilot and the airplane can be descended visually at a normal rate. A missed approach must be executed if the pilot fails to acquire the necessary visual reference at the MDA.

The readout of the flight data recorder (FDR) from PI Flight 200 indicated that the airplane might have crossed the 3-mile DME fix as low as 517 feet, which is 383 feet lower than the prescribed crossing altitude and about 200 feet lower than the MDA of 720 feet. The FDR indicated that the flight continued its descent and passed abeam the building in Rosslyn at about 400 feet m.s.l. In addition, the airplane drifted to the right of the inbound course, placing it nearer the building than normally should occur; the prescribed inbound course passes about 500 feet east of the building.

1/ m.s.l. - Mean Sea Level - all altitudes will be mean sea level unless noted.
2/ VOR - Very High Frequency Omnidirection Range Station - a ground-based electronic navigation aid transmitting very high frequency navigation signals, 360° in azimuth, oriented from magnetic north.
DME - Distance Measuring Equipment - equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid.

The investigation revealed that while PI Flight 200 might have come closer to the building than most airplanes, the occurrence of low flying airplanes over this section of Rosslyn is not unusual. Two witnesses indicated that they had observed three other low flying air carrier airplanes about the time they observed PI Flight 200. During interviews, witnesses indicated that they have observed low flying air carrier airplanes over the past 2 years, during periods of low ceilings.

Because the high incidence of low flying airplanes may be caused by the peculiarities of this approach, the Safety Board evaluated the VOR/DME runway 18 approach, the LDA 3/ runway 18 approach, and the Visual River Approach. The LDA runway 18 approach has an inbound course of 147° and crosses the center of Rosslyn approximately 2,100 feet farther west than the centerline of the VOR/DME 18 inbound course. The LDA runway 18 approach provides electronic glideslope guidance from 3,000 feet at the 9-mile DME fix down to the prescribed MDA of 1,100 feet at the 3.5-mile DME fix. The glideslope cannot be used below 1,100 feet. The LDA approach chart depicts flight over the river beginning at the 3.5-mile DME fix similar to the manner in which flight is depicted in the latter portion of the Visual River Approach. In addition, instructions state: "Fly visual to the airport." No such depiction or instructions are found on the VOR/DME 18 approach charts, thereby implying that a pilot must maintain the inbound course until his airplane is at a point where it can descend on an approximate 3° glideslope to the runway touchdown point. However, the inbound course is not aligned with runway 18, and in order for a pilot to align his airplane with the runway, he is required to maneuver his airplane to the left over the river and then back to the right. Because of the need to maneuver the airplane, a majority of airline pilots who were questioned about the VOR/DME 18 approach stated that once they became visual (clear of clouds), they preferred to maneuver the airplane over the river and fly the latter portion of the Visual River Approach, as depicted on the LDA chart.

The Visual River Approach may be executed whenever the ceiling is at least 3,500 feet and the visibility is at least 3 miles. A flight requires radar vectoring to the final approach course before it is cleared for a Visual River Approach. When cleared for the Visual River Approach, a pilot may (1) visually follow the Potomac River to the airport, or (2) proceed via the DCA/VOR 326° radial (146° inbound), or (3) proceed via the LDA runway 18 approach to abeam the Georgetown Reservoir or the 4-mile DME, before visually following the river to the airport. Prescribed approach altitudes for the Visual River Approach are depicted in the profile section of the approach chart beginning with the 10-mile DME fix at 3,000 feet, crossing the 6-mile DME fix at Chain Bridge at 1,800 feet, and down to the 3-mile DME crossing altitude of 900 feet. After the airplane crosses the 3-mile DME, a pilot may descend on his own since no MDA is prescribed for this approach.

Although a pilot flying his airplane inbound on the VOR/DME 18 approach must cross the 3-mile DME fix before he is authorized to descend to the MDA of 720 feet, the Safety Board is concerned that some pilots may be beginning their descent when they are in visual conditions before they reach the position abeam the highest building if they perceive that they can establish an acceptable descent profile. In addition, the allowable tolerance of the airborne VOR instruments may result in an airplane going closer to the highest building than the approach course path.

3/ LDA — Localizer Type Directional Aid — a NAVAID used for nonprecision instrument approaches with utility and accuracy comparable to a localizer but which is not a part of a complete Instrument Landing System (ILS) and is not aligned with the runway.

The Safety Board believes that a practical way of eliminating premature descents is to add a visual descent point (VDP) requirement to the VOR/DME 18 Approach. A VDP determined by a DME fix would require the pilot to maintain the MDA until the point is reached where a normal (approximately 3°) descent would be commenced. A VDP at Washington National Airport would intersect the 720-foot MDA approximately 1,800 feet inbound from a point abeam the highest building in Rosslyn.

The Safety Board also believes that the LDA approach course should be realigned so that an airplane would come in over the river or closer to the river than is presently required and that glideslope guidance should be provided down to a decision height near 500 feet or the lowest descent altitude that TERPS criteria will permit.

During its investigation, the Safety Board discovered that personnel working at the National Airport Tower/Approach Control Facility are aware that the minimum safe altitude warning (MSAW) is unreliable. The ARTS-3 computer has a program that disables the MSAW when it receives a "low quality" beacon return from any airplane. Although this apparently happens randomly as a result of reflection signals from the buildings in Rosslyn and the location of the ARTS antenna, the frequency of the occurrences could not be determined. A typical comment of the controllers was "when it really gets bad we call the Airways Facilities people and they 'tweak' it up. It then becomes more reliable." The controllers indicated that this was a long-standing weakness in the low altitude alert system at National Airport. As a result, the MSAW system might not alert National Airport's tower personnel of an approaching airplane's excursion at a most critical time.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

> Realign the LDA runway 18 approach course from 147° to 153° or even closer to the Potomac River if possible and provide glideslope guidance down to the lowest altitude allowable by TERPS criteria. (Class II, Priority Action) (A-83-27)
>
> Add a visual descent point (VDP) to the VOR/DME runway 18 approach, located at a point where the VASI glideslope intersects the MDA or where a 3° descent angle to the touchdown point intersects the MDA. (Class I, Urgent Action) (A-83-28)
>
> Amend the VOR/DME 18 approach chart to depict a transition to visual flight over the Potomac River similar to that depicted on the current LDA 18 approach chart and include an advisory to the effect that:
>
>> After obtaining visual reference to the runway, but no sooner than the final approach fix (FAF), transition to visual flight over the Potomac River. Maintain Minimum Descent Altitude until the visual descent point.
>
> (Class II, Priority Action) (A-83-29)
>
> Move the ARTS-3 antenna array to a site where it will provide more reliable operation of the minimum safe altitude warning (MSAW) system. (Class II, Priority Action) (A-83-30)

BURNETT, Chairman, GOLDMAN, Vice Chairman, McADAMS, BURSLEY, and ENGEN, Members, concurred in these recommendations.

Jim Burnett

By: Jim Burnett
Chairman

U.S. Department
of Transportation
**Federal Aviation
Administration**

Office of the Administrator

800 Independence Ave., S.W.
Washington, D.C. 20591

July 5, 1983

The Honorable Jim Burnett
Chairman, National Transportation
  Safety Board
800 Independence Avenue, SW.
Washington, D.C. 20594

Dear Mr. Chairman:

This is in response to NTSB Safety Recommendations A-83-27 through A-83-30 issued by the Board on March 24, 1983. These recommendations resulted from the Board's investigation of a Piedmont Airlines Boeing 737-200, operating as Piedmont Airlines Flight 200, reported by ground witnesses to have flown close to one of several buildings which reaches an elevation of 396 feet above mean sea level (m.s.l.) located at 1000 Wilson Boulevard in Rosslyn, Virginia. At the time, Flight 200 was executing a Very High Frequency Omni-directional Range Station (VOR)/Distance Measuring Equipment (DME) instrument approach to runway (RWY) 18 at Washington National Airport, Washington, D.C.

General Comment. The VOR/DME RWY 18 Standard Instrument Approach Procedure (SIAP) to Washington National Airport has been in effect since December 14, 1972, and meets criteria established in the Federal Aviation Administration's (FAA) Order 8260.3B, U.S. Standard for Terminal Instrument Procedures (TERPS). The presence of large buildings underlying the Final Approach Course (FAC) is not unique to Washington National Airport. When properly flown, the approaches to Washington National Airport present no unusual risk along the approach path and provide more than adequate margins of safety. As with all approaches, adherence to minimum altitude is of paramount importance for obstacle avoidance and compliance with Federal Aviation Regulations. Terminal instrument approach criteria were not designed to accommodate flagrant disregard of published minimum altitudes or rules but are predicated on normal, safe aircraft operations. Changes to instrument approach procedures are ineffective if the SIAP and/or regulations are not adhered to by the flightcrew. The approaches to Washington National Airport are probably the most studied SIAP's in the world.

The FAA's Office of Aviation Safety is currently undertaking a study of aircraft utilizing the terminal instrument approaches to runway 18 of Washington National Airport. The study will result in a statistical assessment of the frequency and extent to which aircraft stray from nominal vertical and horizontal flight paths.

A-83-27. Realign the LDA runway 18 approach course from 147° to 153° or even closer to the Potomac River if possible and provide glideslope guidance down to the lowest altitude allowable by TERPS criteria.

FAA Comment. The FAA does not concur with this recommendation. The Localizer Type Directional Aid (LDA) RWY 18 SIAP to Washington National Airport meets TERPS criteria. Its approach course is optimally aligned over the river, provides glide slope guidance at an optimum elevation, and is consistent with noise abatement policy in a highly noise-sensitive environment. Moving the course from its present position over the river would cause it to overlie an extremely noise-sensitive area and would not make the approach safer or more flyable. In March 1981, the FAA's Eastern Region concluded that improvement of the LDA RWY 18 SIAP by relocation of the localizer, as recommended by the Standards Development Branch Memorandum Report (Report Number FAA-AFS-500-17 dated October 1978), was not practical and the effort was abandoned.

A-83-28. Add a visual descent point (VDP) to the VOR/DME runway 18 approach, located at a point where the VASI glideslope intersects the MDA or where a 3° descent angle to the touchdown point intersects the MDA.

FAA Comment. We do not concur with this recommendation. The VOR/DME RWY 18 SIAP does not qualify for a visual descent point (VDP) primarily because of penetration of the VDP surface which extends upward at a 1.75° angle from the downwind Visual Approach Slope Indicator (VASI) bar. The VASI on the west side of runway 18 is aligned 20° west of the runway centerline and has a 3° glide slope. The existing VOR/DME RWY 18 SIAP altitudes and associated VASI provide satisfactory vertical guidance to the runway. A VDP would require waivers to existing TERPS criteria and would add little if any benefit.

A-83-29. Amend the VOR/DME 18 approach chart to depict transition to visual flight over the Potomac River similar to that depicted on the current LDA 18 approach chart and include an advisory to the effect that:

> After obtaining visual reference to the runway, but no sooner than the final approach fix (FAF), transition to visual flight over the Potomac River. Maintain Minimum Descent Altitude until the visual descent point.

FAA Comment. The FAA nonconcurs with Recommendation A-83-29 in that it is inconsistent with TERPS policy which requires that minimums established be the lowest permitted by criteria. Depiction of a visual track would require increased minimums, since the missed approach point would have to be relocated from its current location near the runway threshold to a point where a visual track would begin, and would effectively increase the probability of missed approaches. The proposed advisory is overly restrictive to pilots who acquire the necessary Part 91.116(c)(3) visual cues prior to the FAF and can transition to visual flight while maintaining an altitude at or above the VASI glide slope until a lower altitude is necessary for a safe landing. In addition, had a VDP been depicted, the phrase "Maintain minimum descent altitude until the visual descent point" would have been redundant, since Part 121.651(c)(4) already states that requirement.

A-83-30. Move the ARTS-3 antenna array to a site where it will provide more reliable operation of the minimum safe altitude warning (MSAW) system.

FAA Comment. We do not concur with this recommendation. Based on the data available, we find no reason to doubt that the facility was operating in a satisfactory manner and located at its optimum geographical position for Washington National Airport.

The radar/beacon equipment, which serves the ARTS-IIIA at Washington National Airport, has been upgraded over the years from airport surveillance radar, ASR-3 to ASR-4 to the present ASR-7/BI-4 equipment. Prior to each equipment replacement, the siting of the facility was evaluated to determine the best location to meet current air traffic operational requirements. In each case, it was determined that the location of the present facility was the best site to meet the overall air traffic operational requirements at Washington National Airport.

Sincerely,

J. Lynn Helms
Administrator

STATEMENT OF HONORABLE ALBERT GORE, JR.
BEFORE THE SUBCOMMITTEE ON
TRANSPORTATION, AVIATION AND MATERIALS

JULY 18, 1983

Thank you, Mr. Chairman.

I want to commend you for convening this hearing on airport safety, since it is a matter that requires our attention, and, as you know, is of great personal interest to me. Our Science Subcommittees conducted hearings on this issue in March of last year, and I believe this is a useful opportunity to measure the Federal Government's progress in a number of areas of concern about operating airports, especially in bad weather.

In that connection, however, I want to point out one particularly disturbing development concerning an issue that until recently I thought we had put to rest.

At our last proceeding we discussed at length the usefulness and efficacy of runway friction testers as a means of conveying better data to pilots about runway conditions during bad weather. At that time, we heard from airport operators present that these friction testers would be a useful item for them to have.

When our Subcommittees' report of the hearing recommended to the FAA that the airports be permitted to purchase friction testers with ADAP grant funds, I thought we had a meeting of the minds, for Administrator Helms agreed. He further stated that many of the necesary tests for permance standards had been done, and that final testing would be executed last winter. It appeared that we had an agreement.

Unfortunately, things are not always what they seem to be. I have been informed that when a number of airports have applied for ADAP grants to purchase testers, they were denied because the correlations and performance standards were not ready yet. In one particularly outrageous case, Lovell Airport in Chattanooga applied for a grant, and got it, only to later have those funds revoked, again because the standards are not completed yet.

Mr. Chairman, I think that at the very least we have an unacceptable bureaucratic Catch-22, where the funds are available, but not really. At worst, the FAA is being disingenuous in purporting to these Subcommittees that we were in agreement, but with no intention of making friction testers available to operators until some later time.

The agency cannot have it both ways. And I submit to you that these performance standards have been studied and researched ad nauseum, and that these funds should be made available to terminal operators immediately, as we thought was the case 9 months ago. Airports like Chattanooga should not be forced to go through another winter without this device while the FAA continues to research a problem right into the ground.

Beech Aircraft Corporation
1777 North Kent Street
Suite 809
Arlington, Virginia 22209
703-276-1000

August 26, 1983

The Honorable Dan Glickman
2435 Rayburn House Office Building
Washington, D.C. 20515

Dear Mr. Chairman:

In the interest of insuring that the record of the Committee hearings in Wichita, Kansas on August 29, 1983 is as complete as time and space permit, may I offer this brief statement for consideration by theCommittee for inclusion in the record of those hearings.

The "Methane Transportation Research, Development and Demonstration Act of 1980" is a federal law in name only. More importantly, the declarations and initiatives trumpeted therein are clearly not regarded by the Executive Branch as policy. Actually, a coherent national energy policy has not been developed by those responsible for implementation of 96-512 and other related laws of the land such as the Clean Air Act and the many environmental protection laws, all of which were noble directives with enormous economic impact.

It serves no useful purpose to continue in this vein or pursue the elusive dream of an environment wherein we can all enjoy a lifestyle and a quality of life at a price we can afford.

By compartimentalization of government, we have managed to pay much more for what we want and need than would be justified were we to do a better job of systems definition, engineering and implementation.

It is a statement of fact that the United States is facing an enormous bill for cleaning up the mess we all made while we were growing up individually and as a nation, especially in the clean air and water quality areas. Methane, the transportation fuel that the 96th Congress recognized as having great potential as a supplement or alternate to petroleum based fuels such as gasoline, diesel propane and heating oil or kerosene or Jet "A" is viewed by the writer as the prescription the doctor ordered.

To illustrate, I've attached a copy of the 25 July New York Times article about the raw sewage fouling both the New York and Boston harbors eleven (11) years after the antipollution law was passed by Congress. By simply incorporating anerobic digesters at the Deer and Nut Island plants in Boston, the city could easily produce millions of gallons of methane annually and save millions of dollars in its annual fuel budget while accomplishing what we all consider essential (and what the Congress decreed).

Using the fuel from the sewage treatment to power trash trucks, police cruisers and buses in all of our major cities (not just Boston and New York) will not only clean up the water but because CH_4 burns "clean" we could enjoy a "free ride" to the clean air side of environmental quality. Permit me just one opinion -- I believe that any vehilce burning CH_4 exclusively would not require an anti-smog device at an individual savings of hundreds of dollars per car.

In conclusion, the 1980 law begs implementation and, with any clear sign by the Congress and the Executive Branchs that this is really the law of the land, the private sector will invest more than its share of any private/public joint venture. However, a fleet conversion committment is essential because the fuel distribution infrastructure for LNG isn't yet in place and introduction of Methane (CH_4) via "tethered" fleet applications will probably prevail throughout this century.

I am grateful for this opportunity to express my faith in government; I truly remain optimistic about the future on this planet and I do believe that man does have the option to survive by overcoming his earlier mistakes.

Faithfully,

John H. Shaffer
Member of the Board

FOUNDED 1928
American Association of Airport Executives
2301 M STREET, N.W. ■ WASHINGTON, D.C. 20037 ■ (202) 331-8994

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August 26, 1983

Scott Crossfield
Technical Consultant
House Science and Technology Committee
Room 2321
Rayburn House Building
Washington, DC 20515

We certainly appreciate your offer to place this additional statement in the record of the subcommittee hearings of July 18. If there are questions or more information needed, I will be glad to respond.

Sincerely,

F. R. Hoyt

FRH:cmr

STATEMENT OF THE
AMERICAN ASSOCIATION OF AIRPORT EXECUTIVES
CONCERNING RESEARCH AND DEVELOPMENT
IN THE
DIRECTION TOWARD AIRPORT SAFETY

Subcommittee to:
Subcommittee on Transportation, Aviation & Materials
Committee on Science and Technology
House of Representatives

Mr. Chairman and Members of the Subcommittee:

The members of this Association are the individuals who manage the nation's public airports. As airport managers they are directly responsible for operating and maintaining facilities that provide a safe environment for all airport users. Due to the fact that, with few exceptions, public airports in the United States are owned and operated by local units of government, it is difficult to collectively mount and sustain any program of research and development in matters that bear on airport safety. Because the Federal Aviation Act specifically directs the FAA Administrator to consider, in the public interest, the "consolidation of research and development with respect to air navigation facilities" and because this committee has within its jurisdiction civil aviation research and development. We submit the following statement which deals primarily with the survivability of aircraft occupants following an accident in which fire is a factor.

--The busier air carrier airports, justifying the need for CFR on frequent operations and the potential for fire that exists in any large concentration of buildings, provided such protection long before the Federal requirement and will continue to do so regardless of regulation. The lower activity airports could find no such justification and the great majority of them did not provide the service until required by regulation.

--The incidence of accidents with fire is extremely low. Using NTSB statistics, we find that there are on the average seven such accidents per year in all (not necessarily passenger carrying) U.S. air carrier operations worldwide. Of perhaps more significance is the number of accidents in which the occupants survived the impact forces but were exposed to fire. The number ranges from zero to three per year. When those accidents which were remote from any airport are eliminated, there remains on average a less than one accident a year in which airport CFR had an opportunity to save lives.

--It is completely unrealistic to expect the limited equipment at the smaller airports (or, in most cases, the extensive equipment found at the larger airports) to favorably affect the survivability of occupants. Most experts agree that survivability in a fire is about 120". Unless the accident "conveniently" occurs in close proximity of the fire station--and most accidents occur in the approach area where access may be impaired or impossible for wheeled vehicles carrying the required large amounts of extinguishing agents--a two minute response is impossible even with multiple fire stations and the best in CFR equipment.

--Proponents of extensive CFR cite the incidence of responses to fuel spills, hot brakes, and similiar incidents as justifying CFR. This may be true at the busier airports where number of such incidents may be significant. However, neither actual nor potential occupants rescue is involved due to the fact that the occupants, if necessary, safely evacuate the aircraft before the CFR response can be made.

--A comprehensive study conducted by an independent firm under contract with the FAA examined all air carrier accidents occuring during the thirteen year period 1966-1978. The highlights of the findings of this study were:

> Certain CFR benefits accrued to the larger airports cheifly in terms of aircraft hulls saved; however, the benefits at the smaller airports were miniscule even considering property saved

and the psychological effect on the passengers.

The probability of an accident occuring in which CFR might prove beneficial comes out to about one in 1,750,000.

Only one life was saved through CFR intervention in thirteen years at the smaller airports. Of more significance was the calculation that a total of only three lives might have been saved with a "perfect" CFR response--perfect being defined as the arrival of the CFR units simultaneously with the crash occurence.

The probability of a catastrophic accident in which CFR might prove beneficial is less than one in one hundred years.

In every case where the facts were not clear to those conducting the study and hence a judgment had to be made, the benefit side of CFR was given the highest possible value.

Any criticism of the actual CFR response, which in some cases might have been justified, is not a valid consideration due to the fact that the study examined the benefits assuming a hypothetical instantaneous CFR response.

--The study contained several recommendationns, chief among them were:

The present CFR requirements as contained in FAR 139 be eliminated at the smaller airports.

The CFR requirements definitely

not be extended to the commuter service airports.

--The cost of providing the service at the smaller airport are way out of proportion to any benefits to the traveling public. Cost cannot and should not be the paramount consideration. However the benefits even including property saving and non-aviation responses, are so minimal that justification for the service is completely lacking.

Simply stated, based on the findings of at least four independent studies, if the fire following an accident is of sufficient intensity to prevent occupants from safely existing the aircraft by their own means, then they will perish despite the efforts of responding CFR services.

The travelling public is being given a false sense of security through the reliance on airport CFR. If survivability of aircraft occupants is to be improved, then there must be intensive research and then prompt implementation of such programs as antimisting of aircraft fuels, reduced flammability of aircraft interiors, and possibily on board temporary passenger protection from fire, smoke, superheated air, and noxious fumes. Antimisting has shown considerable promise but the research has limped along for years apparently with only limited urgency and research effort.

We appreciate this opportunity to present airport management's views on airport safety particularly as it relates to accidents with fire.

ssi®
surface systems, inc.

July 14, 1983

Subcommittee on Transportation,
Aviation and Materials
Suite 2321
Rayburn House Office Building
Washington, DC 20515

Attn: Curt Stanford

Dear Curt,

Attached is testimony to be included in the hearing scheduled for July 18, 1983.

I wish to make it clear that the views expressed in my testimony, whether accepted or not, will not have any effect on my company's business or my own financial status since most major airports now have installed our system.

I am submitting my views as a concerned, private citizen who who has had considerable experience in the field of aviation safety.

Thank you for allowing me to express my views.

Sincerely,

SURFACE SYSTEMS, INC.

Wilson W. Overall

Wilson W. Overall
President

Enclosure

WWO/acb

2605 s. hanley rd. • st. louis, missouri 63144 • (314) 781-5320 • twx (910) 76

Testimony

for

House Subcommittee on Transportation, Aviation and Materials

Hearing

July 18, 1983

Subject: Runway ice prevention Vs runway traction measurements.

Wintertime runway maintenance in snow and ice areas has always been a concern of not only the airport authorities but aircraft operators as well.

When snow and/or ice forms on a runway, there is a corresponding reduction in the surface traction and generally an increase in the aircraft stopping distance. This situation, of course, increases the potential for serious accidents upon landing by overruns of runway or loss of directional control.

The industry has for years sought to give the pilot better information about actual runway surface conditions. This has ranged from airport personnel sliding about in pick-up trucks, to pilot reports, to attempts to mechanically measure traction with a device pulled up and down the runway. There are inherent problems with all of the above methods.

1) Pick-up truck - Crude measurement, very dependent upon experience of driver. Pick-up truck does not correlate to a jet aircraft with auto-skid braking system.

2) Pilot reports - Very subjective; will vary from pilot to pilot based on his experience. Also, type of aircraft, condition of tires and braking system, weather factors, etc., all have a bearing on pilot's estimate of the difficulty of the landing.

3) Traction measuring device - Gives a quantative value that the majority of pilots do not recognize; tests performed 6 - 7 years ago by USAF, NASA, and FAA on wet surface (not even icy or snow covered surface); were not successful in correlating a traction value to aircraft stopping distances. Also, equipment is difficult to maintain.

In addition to the shortcomings listed above, there is one basic, common problem with all three methods: they are all measurements (however crude) taken at one point in time. A runway can turn from wet to icy in a time span of a few minutes. We have documentation of cases where this has happened.

In the case of traction measuring devices, assuming they could be correlated with aircraft stopping distances, it would be required to continually run the unit up and down the runway to provide meaningful, real time runway information. This would be highly impractical at a busy airport.

Now, the FAA is now beginning another program that will cost over a half million dollars to essentially repeat the research program that NASA/USAF/FAA did 6 - 7 years ago. This time they are to include snow and ice covered surfaces.

What will they accomplish? At best, maybe an improved method to tell how bad the runway condition is at a specific point in time, but never the runway condition when the plane actually touches down. At worst, a half million dollars of taxpayer money will be wasted repeating a test program that was inconclusive some years ago.

It seems the approach has been, "Let's measure how bad the runway condition is, rather than trying to prevent critical runway conditions".

Also, if a pilot is told the runway traction is .15, would he react any differently than if he were told the runway is icy? It seems he would take the same precautions when landing in either case.

How do we prevent icy and snow covered runways? First of all, we can never prevent 100% of ice and snow formation on runways. However, most of these situations can be prevented by using American technology available today and already in place in most major airports. I am referring to an operational philosophy called anti-icing, prevention of snow and ice formation on runways. The objective is to never permit the runway conditions to become anything but dry or wet.

A few American airports are using this anti-icing approach; however, the majority are not. This approach has been discussed and supported by the American Association of Airport Executives' International Aviation Snow Symposium for the past 10 years. Also, the FAA has recognized the advantage of this concept in several of its Advisory Circulars that have been issued during the past four years.

To get the most out of an anti-icing program requires the use of runway anti-icing chemicals which have been available since the late Sixties. Also required is a high speed application device (spray rig or a spreader) and the usual complement of snow brooms, plows, and blowers.

To know when to use the chemicals is almost as important as having them. It is very important to apply the chemicals at the right time and in the correct amount. To do this, an electronic sensor system is available. It is the key to an effective anti-icing program.

There will be approximately 40 of these systems installed at the major U. S. airports by this winter (1983-84). These systems are available under the FAA's airport improvement program (AIP). Therefore, most airports already have the equipment necessary to actively pursue an agressive prevention program.

What about snow? Several years ago a large hub airport in the Rocky Mountain area experimented with liquid ice control chemicals to determine its effectiveness in keeping a runway wet during a snow storm.

Chemicals were applied prior to snowfall, thereby melting the snow as it came in contact with the runway. The results were mixed.

The point here is that the FAA should be spending its research money to evaluate more fully this type of snow control rather than trying to measure how slippery the runway has become.

The FAA's effort in this area should also actively encourage and support airports in establishing a prevention system.

In the NTSB hearing of May 3, 1982, concerning the effect of runway surface conditions on aircraft performance, several references were made concerning anti-icing programs during testimony about runway sensors. Statements by Col. Leonard Griggs from St. Louis and Dan Orcutt from Indianapolis referred to putting down chemicals in advance to prevent the situation from becoming critical. However, the concept of anti-icing did not surface.

For the entire aviation industry to realize the full benefits of a prevention program, it must be implemented on a national scale. This can be done only by support and encouragement of the FAA.

Traction measuring devices are a necessary maintenance tool, the purpose for which they were designed. They provide an indication of when a runway needs to be re-surfaced or have rubber removed.

However, because it gives a traction value at a specific point in time (it is not real time), it would need to be constantly on the runway and therefore it is not suited to be an operational tool.

Measuring the traction of a critical runway surface is a passive approach to a very serious problem. Attempting to prevent the critical situation is an active and very desirable approach to solving the problem.

The question that should be asked is: Why spend taxpayer money to re-study old methods to tell pilots how critical the surface is at a specific point in time?

The FAA should be spending that money to create and encourage a nationwide prevention program for all the airports of this country.

Respectively Submitted,

Wilson W. Overall

Wilson W. Overall
President
SURFACE SYSTEMS, INC.

WWO/acb

AUTOBIOGRAPHY

Name: Wilson W. Overall

Age: 46

Present Position: President and founder of Surface Systems, Inc., manufacturer of runway surface sensor systems.

Education: BSEE, University of Missouri, Rolla, MO
MBA, St. Louis University, St. Louis, MO

Career: 1968-1972. Monsanto Company, St. Louis, Missouri. Main project to develop liquid ice control product for runways. Did research and development and market introduction.

1972-Present. Invented and developed the SCAN ice detection sensor. Founded Surface Systems, Inc. in 1972. Hold several U. S. and foreign patents on the sensor. Company now has sales over one million dollars, with 18 employees; sales in United States, Canada and Europe. Have served as expert witness concerning runway snow and ice problems.

Organizations: Have been on AAAE's Snow Symposium Planning Committee for five years. Have given a number of speeches at symposium about proper use of chemicals and anti-icing program. Also belong to American Public Works Association.

OFFICIAL TRANSCRIPT

Before the

NATIONAL TRANSPORTATION SAFETY BOARD

Case No. SA-478

In the Matter of:

A SPECIAL INVESTIGATION OF THE
EFFECT OF RUNWAY SURFACE CONDITIONS
ON AIRCRAFT PERFORMANCE

Place: Washington, D. C.

Pages: 1 thru 197

Date: May 3, 1982

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NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C.

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A SPECIAL INVESTIGATION OF THE
EFFECT OF RUNWAY SURFACE CONDITIONS
ON AIRCRAFT PERFORMANCE

: DOCKET NO. SA-478

- x

Wednesday, May 3, 1982
Third Floor Auditorium
Federal Office Building 10-A
800 Independence Aveenue, S.W.
Washington, D.C.

The matter came on for hearing at 9:00 a.m.

BOARD OF INQUIRY:

Honorable Patricia A. Goldman Vice Chairman, NTSB
Chairman Board of Inquiry

David. F. Thomas, Hearing Officer, Aviation Accident Division,
Bureau of Accident Investigation, NTSB

James Danaher, Deputy Director, Bureau of Accident Investigation, NTSB

William G. Laynor, Deputy Director, Bureau of Technology,
NTSB

Leslie D. Kampschror, Chief, Vehicle Factors Division,
Bureau of Technology

John Ferguson, Senior Air Safety Investigator,
Operational Factors Division, Bureau of Technology, NTSB

worse than the other. The airlines certainly have a role in this.

It is the pilot's call. Nobody wants to kill anybody. Remember the guy in the front of that airline, doesn't want to die any more than the guy in the back of the airplane. Remember that.

MR. FERGUSON: I do.

VICE CHAIRMAN GOLDMAN: As a former pilot.

Thank you. I should like to comment, you may have heard the sound of relief above us. I am told that they have discovered that we are on a separate air conditioning system and that we are going to get some relief and it is on.

Colonel Griggs, you had mentioned that you had recently installed the runway sensoring system. It was recently?

MR. GRIGGS: We have had it for two years. We have also rebuilt all of our runways. It is being reinstalled on one runway. We are not the only airport that uses it. There are 13 electronic sensors and we will go to 20-some, spaced in and around the airport, which gives us runway temperature and conditions.

It lets me get on top of a situation fast. If I know the outside ambient air, dew point, get within two degrees, I can anticipate fog. If the temperature drops, I can anticipate ice. So I will put down glycol prematurely maybe before I get the condition or Urea. It is a management tool.

VICE CHAIRMAN GOLDMAN: It sounds like, has it changed your operations somewhat?

MR. GRIGGS: It has changed our approach to be more efficient to use some of thse tools at our disposal.

VICE CHAIRMAN GOLDMAN: Mr. Davidson or Mr. Hoyt, could you comment from among your membership on how many other airports -- you said others, too? Do you have any idea how many are major ones or whether this is the process being installed?

MR. HOYT: I don't know about numbers. Usually the more complex the runway layout is the more justification there is for that. If you are talking about a single runway an experienced person, they can do about as well as the sensor. But if you are having a completion of runways where you need to get readings from the various points, then I think there is several applications. I really don't know the numbers. I have no idea how many airports actually use that. Perhaps later panels could give you a better idea.

VICE CHAIRMAN GOLDMAN: We will certainly inquire whether or not they have it.

Captain Ruddy, did you want to comment?

MR. RUDDY: Yes, relative to Mr. Hoyt's observation that the larger airports might have more use for it. Once again we get back to the problem of small airports often being the most critical. I am a strong supporter of the concept of electronic detection of snow and ice, having done some work in this area for ALPA. And the best example I can provide, a few years ago going from Washington to Pittsburgh in the afternoon, the ambient temperature at Pittsburgh was 28 degrees below freezing. The runway reports were that the runway was wet. Notwithstanding the fact it was 28 degrees and the braking was fair to good. We left here, got within about 10 minutes of Pittsburgh, began to get some indications that maybe the braking wasn't all that good.

By the time we crossed the outer marker, about 5:15 in the evening which is important in the wintertime, by the time we crossed the outer marker the aircraft ahead of us made the comment, hey, this is slippery. We landed and couldn't turn off the runway. What had happened, the ambient temperature at 28 degrees, would ordinarily freeze the surface, but the sun kept the surface above freezing, consequently it had been wet in the reports for braking action fair to good.

In 10 minutes time it went from fair to good to the point where we couldn't turn off the runway and the airline behind us had to go around. So the ability to have this information made available to us, what the surface temperature is, they have electronic alerting when it gets within two degrees of freezing in these systems. This sort of information will be invaluable to us in determining actually what is on the runway.

VICE CHAIRMAN GOLDMAN: Good afternoon, ladies and gentlemen.

See how cool we got this over the recess.

I would like to ask the panel to please come forward.

PANEL 2 - PRESENTATION OF

MR. WILLIAM C. COLEMAN, DIRECTOR OF AVIATION, BOSTON LOGAN INTERNATIONAL AIRPORT

MR. DANIEL J. NORTON, AIRPORT MANAGER, DETROIT METROPOLITAN-WAYNE COUNTY AIRPORT

MR. BOOKER BURLEY, HARTSFIELD ATLANTA INTERNATIONAL AIRPORT

MR. RICHARD REBADOW, GENERAL MANAGER, GREATER BUFFALO INTERNATIONAL AIRPORT

MR. DANIEL C. ORCUTT, EXECUTIVE DIRECTOR, INDIANAPOLIS INTERNATIONAL AIRPORT

VICE CHAIRMAN GOLDMAN: If I ask for your attention, please, we are going to proceed.

For your general planning for this afternoon's purposes we anticipate taking roughly an hour-and-a-half with each panel with a ten or fifteen minute break in between.

I would like also to mention for the participants on this table as well as the others, during the recess that some people in the audience were having trouble hearing. So if you would try to remember, I am sorry we don't have the number of mikes there.

For those of you who were not here this morning, I am Patricia Goldman, Vice Chairman of the National Transportation Safety Board and I would like to welcome you to the second session of our board of inquiry hearings on the effect of runway surface conditions on the aircraft performance.

I would like to give this afternoon's testimony by asking Mr. William Coleman, Director of Aviation For Boston Logan International Airport, to give a statement. We will proceed under the same rules with a ten-minute statement, if they need to take that long, from each of the witnesses and then we will proceed by questioning from the panel.

Mr. Coleman, could you begin?

MR. COLEMAN: Good afternoon. My name is William C. Coleman. I am Director of Aviation for the Massachusetts Port Authority, operator of Boston-Logan International Airport.

I would like to thank Vice-Chairman Goldman for the opportunity to present our comments for consideration by the NTSB in this special symposium.

My written testimony includes comments on Boston. For your information, I will move directly to responsibilities under Part 139 rather than cover those comments.

The responsibility of airport operators under 14 CFR Part 139 has two essential elements; removal of accumulated precipitation, and the reporting of airfield surface conditions. We implement the requirements of these regulations through a comprehensive snow plan which is a component of our FAA equipped vehicle throughout snow removal operations on non-active runways and taxiways who is aware of the general airfield conditions.

His observations will either be used as the basis for an updated field condition report which is forwarded to FAA and airport users via the airport telautograph, or will trigger additional snow removal efforts.

This past season we gain operational experience with the use of a newly installed "scan" system of runway surface condition monitors which report wind speed and direction, precipitation, runway surface temperatures, and air temperatures at a computer terminal in our operations office.

Our initial experience with the device indicates that it represents a worthwhile addition to our monitoring capability.

The information it provides is a valuable additional check on the occurrence of icing conditions and gives rapid updates on air and surface temperatures, critical to ice formation, which were not previously available in our operations office.

This system has also allowed rapid redeployment of our sanding efforts in response to actual conditions on various parts of the airfield.

Information gathering is only the first tier of the reporting process. The second tier requires the assessment dwell on them here but offer them for your consideration.

They relate primarily to access of information by airlines and the relatively impact on touchdown of precision and approaches.

Thank you.

VICE CHAIRMAN GOLDMAN: Thank you.

Mr. Norton?

MR. NORTON: Madam Chairman, members of the Board, in Detroit in addition to our efforts in standardizing equipment basically the case of operator familiarization, maintenance and parts inventory.

Early in 1970, we concentrated on tracking and monitoring the airfield airport conditions. This was done through contract of whether services, the installation of pavement sensors, the use of the Mu Meter and the telautograph communications system.

Our interest in the contract weather forecasting system is not only the notification of an accumulation of snow, and temperatures, but primarily windshifts. In removal of snow, it is vital that you keep abreast of the windshift so that you are not completely through with one runway when you should have been on another and again these are in each case toos which we utilize and really make available to the experienced maintenance supervision of the airport.

The pavement sensors again are a monitoring system that we use. We presently have three on each of our four major runways and, again, they are utilized as you heard this morning in the measuring of air temperatures, pavement temperatures and the question of freezing.

We have attempted anti-icing. I say "attempted". Some other airport may have found success with that. But we haven't. We feel and found it extremely difficult to put down a liquid chemical in a rain storm at $3.25 a gallon, although we use between 60 and 90,000 gallons a year.

Probably the two areas in today's subject of the least scientific are the removal and the clearing methods. We, in Detroit, hav viewed this from the standpoint of providing the maintenance department with as much information that they can make a value judgment as to when and how.

I submit that the guidelines of the first snowfall pass down the center line of a runway ain't necessarily so always.

I think we probably -- I have heard this morning -- are somewhat of a maverick in measurement. As I say, we purchased our first Mu Meter in 1972. We use it.

Our second one was purchased in 1978. We do provide a Mu Meter measurement as an advisory to airliens and our dedication in this, I suppose, can be measured, that we are now engaged in discussions with the North Air, Inc., for the purchase of the SAAB friction testing machine that we than Part 139 and maximizes safety and yet simultaneously maximize airport operation.

If the airport operator has exhibited the capability to work and provide a safe operations within the parameter of the Operations Manual, then it is our position that there is no need for other than cursory inspections by FAA inspectors.

To do otherwise in our opinion would only add an element of confusion in the command situation and thus hamper operations and safety.

Thank you.

I will entertain any questions if there are any.

VICE CHAIRMAN GOLDMAN: Thank you, Mr. Burley.

I am sure there will be some.

Mr. Orcutt?

MR. ORCUTT: Thank you, Madam Chairman, members of the panel.

Comments of the Indianapolis Airport Authority are going to be almost identical to those of Boston. Indianapolis is one of the major airports in the Nation. It is 30th out of most of the airports, out of 65 airports. We are in the middle of the airport group.

Around 65 percent of our operations are general aviation, 35 percent are air carrier and as required by FAR 139, we have a snow removal plan, had in fact had one for more than 20 years, long before Federal regulations required it.

To give you some scope of what our snow requirements are, Indianapolis has an average of only 22 inches of snow per year but last year we had 52 inches and some half dozen storms of five or six inches or more. Temperature is also an important factor.

Last year, actual temperatures were 21 below zero with wind chill factors 60 and 65 degree below zero.

I mention these because they take a terrible toll on men and equipment. Like all the rest of the airports and other people have told you, each snow strom, each airport is unique in its approach. It is very difficult to establish standards on approach in the handling of a strom. At our airport we also have runway sensors in the runway ramps, taxiways. We use them more in the area of evaluation of when to put down chemicals, how much time we have before situations become critical. We also have an annual update of our snow removal plan every year in the summer and we have participation by the airlines, the FAA, our airport safety department, operations personnel and maintenance people.

We actually put the snow plows on the trucks and we let the FAA tower operators, airline pilots, captains drive our snowplow, let them get them up to 35 miles-an-hour and then tell them to hold short of an intersecting runway when they are about 300 feet away and they begin to get an appreciation of what it takes to stop a heavy duty truck.

there are very adverse conditions and it is very difficult to maintain a heavy duty truck much less a delicate instrument. I think there needs to be some work done in the description of airfield and airport conditions. Although the FAA advisory system refers to good, fair, poor, nil, we hear words like normal, medium, we found out that the NOTAM codes don't necessarily agree with some of the advisory circulars, the IKO codes in turn don't agree with the NOTAM Q codes and the ATA and some of the manufacturers use different references to methods of measuring runway friction.

I share with my fellow airport managers a real concern and a dedication to airport safety. I don't think you will find anybody in the field who isn't committed to trying to keep their airport as safe as possible and we are here not only to participate but to learn also.

Thank you.

VICE CHAIRMAN GOLDMAN: Thank you, very much.

Mr. Rebadow is expected to be here. He has had some difficulty apparently making arrangements and if he comes in -- has he come in?

If not, he may join the panel when he arrives.

With that, thank you, gentlemen, for your statements.

I will turn to Mr. Thomas to begin the questioning.

MR. THOMAS: Thank you, Madam Chairman.

Snow creates certain problems in the airport but from the testimony that, so far the testimony this morning, it seems like ice is really the elusive thing there.

What is the state of the art with ice detection, ice removal? We have the use of chemicals, not the use of chemicals, sanding and not sanding. I guess I would like to address starting with Mr. Orcutt, the procedures you use for ice detection and the combating of any problems caused by ice at your airport.

MR. ORCUTT: As you indicate, there is really three things. One is the ice detection, ice prevention and then ice removal. We believe that prevention is well worth the effort.

In the area of detection, we have the surface system monitors. As indicated earlier, you can still have an ambient temperature well below freezing but have a surface temperature that is above freezing and depending on what the next day's temperature is going to be, you could probably make it through the evening or the night without icing conditions on your runway.

If, however, the rate of loss of heat from your surface, you can keep track of how fast it is going out; is obvious that you are not going to make it through until the sun is going to get on the next day, we use liquid chemicals as an anti-icing procedure.

Usually there is not enough moisture in the ground. We will use liquied chemicals anti-icing. It has a two-fold

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We don't use very much sand at all. We use sand on turn-offs and in an absolute emergency, and usually in the push-back area of the gateways. One of our problems with the sand is in our part of the country there is a restriction on natural gas. So you cannot heed or maintain the sand during the winter. It is shut off in November, not turned back on until April. So there is a very limited supply, mixed with urea or liquid chemical and applied very sparingly.

MR. BURLEY: We do not use sand, but we are considering experimenting with it. We feel that on our taxiways and our exits that it would benefit us if we can get a good grip as far as the industry is concerned about damage of the aircraft during the utilization of sand.

We are not at the present using it. But it is under consideration.

VICE CHAIRMAN GOLDMAN: Thank you.

This morning we had some discussion on runway sensoring equipment. I believe one of your statements mentioned it. Could you comment on whether or not your airports have the runway censoring equipment and what your experience has been in terms of whether there has been a change or improvement in being able to forecast coefficient conditions because of it?

MR. REBADOW: I have been at airports where they have it, and I think it is very, very effective. Again with my complement of manpower, inspections of runways, I have used money in other areas, like equipment acquisiton. I think it is very positive, it is very good. But the way we inspect that runway, we are right there when it happens, we save a lot of time.

MR. ORCUTT: We have them. As I indicated earlier, on the runway, taxiways and the ramp, paid for them in the first season and the way they are used is not necessarily to alert us of a situation, but to help us assess the application of chemicals.

If there is a 4 or 5 degree spread in surface temperature and air temperature, we can postpone or vary the amounts of chemical applied to the runways and taxiways. So we use them as a cost control measure and as I have indicated, easily paid for them in the first year.

We are on our second generation of sensors and looking forward to more improvements in that area.

VICE CHAIRMAN GOLDMAN: Does anyone else have anything to add?

MR. NORTON: Basically we probably utilize them. We first installed them in '74. We have since installed 12 additional units.

Again, primarily we use them as a tool. If you watch those sensors, you can literally see that temperature rise or fall within 10 minutes or less increments. You well could save from using liquid chemicals where othersie you probably, we probably would have made a decision to utilize them.

But it is another management tool, really.

MR. BURLEY: We do not have censors.

MR. COLEMAN: We have them in Boston-Logan and installed them last summer, on our principal KAT-2 runway, and also on the runway we use when the storm clears. We have had extremely good success with them. We are looking forward to the cost-benefits that they have talked about in Indianapolis. But I think it has been very useful in monitoring trends and that is probably the most important thing that we use it for, to notify our people when to go out and reinspect, check up on things.

VICE CHAIRMAN GOLDMAN: There has been a lot of talk about the snow committees. There is some perhaps confusion about the formality of it.

Mr. Coleman, starting with you, is this something the committee fully meets, for each snow and inclement [illegible] or is it something that is there available? [illegible] actuality, or availability?